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DRA

Contract: NASW 2837



MARKET STUDY:

WHOLE BLOOD ANALYZER

(NASA-CR-153254) MARKET STUDY: WHOLE BLOOD
ANALYZER (IIT Research Inst.) 113 p HC
A06/MF A01 CSCI 06D

N77-25775

Unclas
G3/52 15038

Prepared for:

National Aeronautics Space Administration
Technology Utilization Office
Washington, D.C.

Submitted by:

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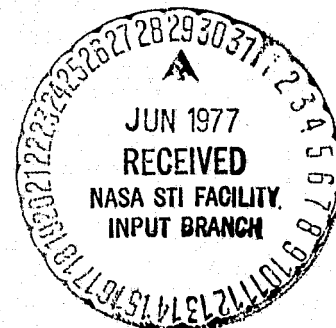


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1. INTRODUCTION AND BACKGROUND

1.1 Introduction

This market survey was conducted by the Techno/Economic Studies Group of the IIT Research Institute to develop findings relative to the commercialization potential and key market factors of the Whole Blood Analyzer which is being developed by Orion Research Incorporated in conjunction with NASA's Space Shuttle Medical System. The following discussion presents our findings on the nature and the size of the potential market and the key factors affecting the commercial prospects for this device.

1.2 Background

Since 1970, Orion Research Inc. has been working under a NASA contract to develop a specialized blood analyzer for use in conjunction with NASA's Space Shuttle missions. NASA's requirement has been to develop a blood analyzer which can be carried on the Space Shuttle to provide immediate, on sight analysis of a variety of blood parameters. Because of the need to be carried onboard the shuttle, the device has been designed to occupy a minimal amount of space, be highly reliable, and only require a very minute amount of blood to perform its analysis. Our investigation of the commercial potential for this system has shown that there is a definite need and apparent ready acceptance by the medical community for this instrument. Further, there appears to be no single product on the market at the present time possessing all of the planned capabilities of the NASA Whole Blood Analyzer. Research and product development is continuing at Orion Research and the analyzer is expected to be commercially introduced in 1978.

The instrument has been designed to measure a full complement of blood gas and blood electrolyte values and would occupy a volume of only 1-2 cubic feet. Specifically, the instrument will measure pO_2 , pCO_2 , pH, O_2 saturation, hemoglobin, total bicarbonate, Na^+ , K^+ , Ca^{++} , total calcium, and chloride. Optional parameters, such as glucose, ammonia, and blood urea nitrogen could be available in the instrument at an additional cost. The required blood

sample for use in the device would be less than 1 milliliter of arterial whole blood and turnaround time for measurement and calculation is less than one minute. The output of the instrument will be both visual digital display and printed form. Since determination of both blood gases and electrolytes are typically only desired from critically ill patients where results are needed immediately, this instrument would appear to be ideally suited for such applications. The cost of this system is expected to be approximately \$15,000 and the cost of optional parameter measurement capabilities would probably be on the order of \$500 to \$1,000 per parameter.

Among the major benefits offered by the whole blood analyzer are:

- o Immediate readings of a full complement of patient blood chemistry parameters with respect to electrolytes and blood gases.
- o Requires only 1 milliliter of whole blood for analysis making it ideally suited for neonatal and pediatric applications.
- o Very rapid turnaround time.
- o Small size of instrument for ease of portability.

As we have stated, the cost of this blood analysis instrument would be on the order of \$15,000. Further we would estimate that annual operational expenses to cover maintenance, calibration, replacement, etc. for the system could probably cost approximately \$4,000 to \$5,000 per year. Thus, with hospital or lab charges of approximately \$50 to \$75 per complete blood gas and electrolyte analysis for a patient, only about 150-250 tests per year would be required to make the system economically viable.

1.3 Patent Status

Orion Research Inc. has patented and owns right to the electrodes used in the development of this Whole Blood Analyzer and NASA has waived its rights to patents on this analyzer to Orion Research Inc.

2. NATURE OF THE MARKET PLACE

The measurement of blood gas and electrolyte parameters are typically only required from acute non-ambulatory patients. Patients in such a condition would generally only be located within a hospital, as opposed to a physician's office or clinic, and therefore, that is where such an instrument would be located. Large hospitals, which would have the financial resources to be able to purchase a number of these instruments, could have use for them in any or all of the following hospital areas: general lab, pulmonary function lab, intensive care units (which includes surgical, cardiac, neonatal, and general medical intensive care), operating room, and emergency room. All of these locations represent specific stations where the capability to measure the blood parameters offered by the NASA Whole Blood Analyzer would be required and used. Clearly, medium and smaller hospitals may have need for only one instrument which would probably be located within their general lab. Very small hospitals (less than 100 beds) probably would not have a sufficient demand or requirement for this type of measurement capability and existing equipment may be sufficient for their needs.

Hospitals can differ in terms of internal laboratory organization and there are many potential areas of responsibilities within a hospital which could purchase such equipment. In general, the key purchaser decisionmakers would be the director of the specific laboratories which could have need for this type of instrument, or the head of the overall department within the hospital.

Another potential market for the Whole Blood Analyzer could be in hospital areas aboard ships, more specifically, U.S. Navy vessels. Naval ships that have sufficiently large crews and a medical staff to warrant use of the blood analyzer could include aircraft carriers, frigates, cruisers and tenders. Clearly, an instrument built for shipboard use must be rugged and able to stand the occasional jarring environment aboard a ship, more so than a landbase device. As this analyzer was originally designed for the space shuttle mission it should be easily adaptable to meet the needs of

shipboard use (at a price slightly higher than the model for land use). In potential procurement by the Navy, the Navy Medical Research and Development Command must recommend the instrument to the Bureau of Medicine and Surgery. The Bureau of Medicine and Surgery would then make a final decision and proceed with procurement steps if implementation is warranted.

There would appear to be also an additional market for this type of equipment within medical research areas such as in University hospital research labs, research institutes, and also possibly in research labs of private firms such as pharmaceutical firms. Also some well equipped mobile medical units, special field hospitals used by the Army, and large paramedic organizations may find this device to be useful in some aspects of their operation. Our survey of these potential users, however, indicates that the blood analyzer's usefulness may be limited, because the nature of their operations generally involves transport of a patient to a somewhat permanent hospital or medical facility.

The developers in this instrument feel that a trained technician would not be necessary to operate the instrument. However, our survey of lab directors has shown that hospitals would require that trained technicians operate the equipment as a matter of precautionary professional practice. This procedure is taken in nearly all uses of key instrumentation as potential backup if the machine becomes faulty or provides erroneous readings. As with most new instruments introduced to the medical community, there is substantial conservatism on adoption of new technologies until substantial tests, clinical trials, and published results are widely disseminated. Because of the impressive capabilities of this device, there has been some skepticism expressed in regards to the accuracy of the analyzer in its capabilities to measure all of the required parameters; however, at the same time, medical practitioners have expressed enthusiastic interest in keeping abreast of developments, tests, and commercial availability.

3. COMPETITIVE ENVIRONMENT

At the present time, the Whole Blood Analyzer is a unique instrument and there appears to be no device currently on the market which can perform the broad range of both blood gas and electrolyte measurement which can be provided by this instrument.

Currently, the major producers of blood gas and blood electrolyte analysis instrumentation include:

Blood Gas

- Corning Medical Instruments
Medfield, Mass.
- Radiometer A.G.
Copenhagen, Denmark
- Instrumentation Laboratory Inc.
Lexington, Mass.

Blood Electrolyte

- Technicon Corp.
Tarrytown, New York
- Beckman Instruments
Fullerton, Calif.
- Instrumentation Laboratory Inc.
Lexington, Mass.

We have included commercial product literature and specifications of equipment of these five major producers in the Appendix to this report.

Presently, in order to measure both blood gas and electrolyte parameters, a variety of types of instruments would have to be purchased. We would estimate that it would currently require approximately \$30,000 to buy about 5 different instruments to provide the same range of capabilities in measurement of blood gases and electrolytes (sodium, calcium, pH, and blood gases, total calcium, chloride and CO₂) which can be provided by the whole blood analyzer. Further, the use of this existing equipment clearly would be much more expensive and require more space, more time for operation, and a larger amount of blood than the NASA analyzer. Thus, the anticipated \$15,000 commercial price of the whole blood analyzer appears quite attractive in the market place.

4. MARKET SIZE

As we have stated, the relevant market segments for the Whole Blood Analyzer would consist of hospitals, medical units on naval ships, and research applications. General private clinics and commercial labs would not appear as suitable markets at this time. As we have stated, major use of this instrumentation would be directly with critically ill patients and, as such, the device would have to be located within the health care facility treating such patients.

4.1 Total Potential Market and Penetration Rates for Hospitals

There are 7,481 hospitals in the U.S. and their potential purchase of the Whole Blood Analyzer would be related to the size of the hospital and the daily volume of blood gas and electrolyte tests. Most small hospitals because of their lack of demand and size would probably not be considered potential purchasers but those that could purchase the instrument would place the unit in their general lab. Medium size hospitals may only be able to accomodate 1 unit each and also would probably utilize the device in the general lab.

Large hospitals could very likely justify purchase and use three units. One would be placed in the general lab and the other two instruments could either be in the intensive care unit, the operating suite, or the emergency room depending on the desire of the individual hospital. For very large hospitals (over 500 beds) we estimate an average of four units might be distributed among the general lab, intensive care units, and the emergency room. We estimate the total potential hospital market for the Whole Blood Analyzer to be approximately 8,000 units. The Figure 1 on the following page summarizes the market size data for hospitals.

Clearly, the large and very large hospitals which would ultimately purchase multiple units, represent major potential purchasers in the hospital segment. We believe that these purchases represent about 70% to 80% of the potential sales volume to hospitals and thus could justify significant promotional and commercialization efforts.

POTENTIAL MARKET SIZE AND POTENTIAL
SALES FOR HOSPITAL MARKET SEGMENT

Size of Hospital	Number of Hospitals	Potential Total Number of Units	Total Potential Market Size	Potential Sales			
				1st Year		3-5 Years	
				Penetration Rate	Sales Volume	Penetration Rate	Sales Volume
Small (under 100 beds)	3934	1 unit per 20 hospitals	196 units	2%	4 units	5%	10 units
Medium (100-300 beds)	2259	1 each	2259 units	5%	113 units	25%	565 units
Large (300-500 beds)	1085	3 each	3255 units	10% purchase 1 unit	325 units	25% purchase 1 unit	814 units
Very Large (over 500 beds)	581	4 each	2324 units	25% purchase 1 unit	145 units	50% purchase 2 units	581 units
All Hospitals	7481	-	8034	-	587 units	-	1970 units

Figure 1

At a price of about \$15,000 per instrument, the hospital market segment could represent initial potential sales of \$8.8 million dollars up to about \$29.5 million 3-5 years after commercial introduction.

4.2 Market Size for Navy and Research Uses

There are approximately 700 naval vessels which can be considered large enough to potentially justify purchase of the Whole Blood Analyzer. Naval medical personnel had a very positive response to the availability of this type of instrumentation and felt optimistic about potential purchase for shipboard use, if the device performs as claimed. As we have stated, this type of medical instrumentation must be reviewed, tested, and evaluated by the Naval Medical Research and Development Command prior to any procurements. Therefore, it would be advisable to provide the Navy with specific test units in advance of commercial introduction of such equipment to minimize delay in procurement and assure availability of instruments if approved.

We would estimate that probably 10% of potential shipboard purchases could be initially achieved, and possibly 40% penetration can be obtained 3-5 years after introduction.

The final market segment, that of research applications, represents a relatively small group. We believe that there are a total of about 200 potential purchase organizations in this group and that potential sales to these organizations could be a total of about 20 units initially to a total of 50 units several years after introduction.

4.3 Potential Sales Summary

Figure 2 on the following page presents a summary of the total potential sales to the identified market segments. If the Whole Blood Analyzer is developed and good results are obtained from clinical trials and evaluations verifying the current claims, then potential sales and implementation by the medical community should be impressive. At a price of \$15,000 per unit, initial sales could reach 670 units or about \$10 million. After 3-5 years

POTENTIAL SALES BY MARKET SEGMENT

MARKET SEGMENT	NUMBER OF POTENTIAL USERS	TOTAL POTENTIAL MARKET SIZE	POTENTIAL SALES	
			1st Year	3-5 Years
Hospitals	7481	8034	587 units	1970 units
Navy Ships	700	700	70 units	280 units
Research and Other	200	200	20 units	50 units
Total	8381	8934	677 units	2300 units

Figure 2

after introduction, sales could amount to a total of about 2,300 units or \$34 million.

5. COMMERCIALIZATION FACTORS

The channels of distribution for the Whole Blood Analyzer would basically be through established medical products channels used by Orion Research. Their salesmen and existing products in the medical field would provide ready market entry for the Whole Blood Analyzer.

As we have stated, the medical community is conservative in its adoption of new instruments until substantial tests, clinical evaluations, and published results are distributed. Product acceptance of the Whole Blood Analyzer could be stimulated by publication and dissemination of results of clinical trials in appropriate medical journals. We believe an effective method of promoting both product acceptance and increasing awareness of the capability of the instrument would be to provide a test unit to selected key medical organizations and/or practitioners. Major opinion leaders could be identified by Orion in the blood analysis instrumentation area and their assistance in evaluating the instrument should be obtained.

6. INTERESTED PARTIES

The following people have expressed an interest in the further development of the Whole Blood Analyzer:

Dr. Barry Shapiro
Northwestern University Memorial Hospital
Chicago, Illinois 60611

Mr. Richard Farmer
Chemistry Superior
Damon Laboratories
115 4th Avenue
Needham, Mass.

Dr. Alan Chakrin
Department of Pathology
Northwestern University Memorial Hospital
Chicago, Illinois 60611

APPENDIX

Commercial Product Literature

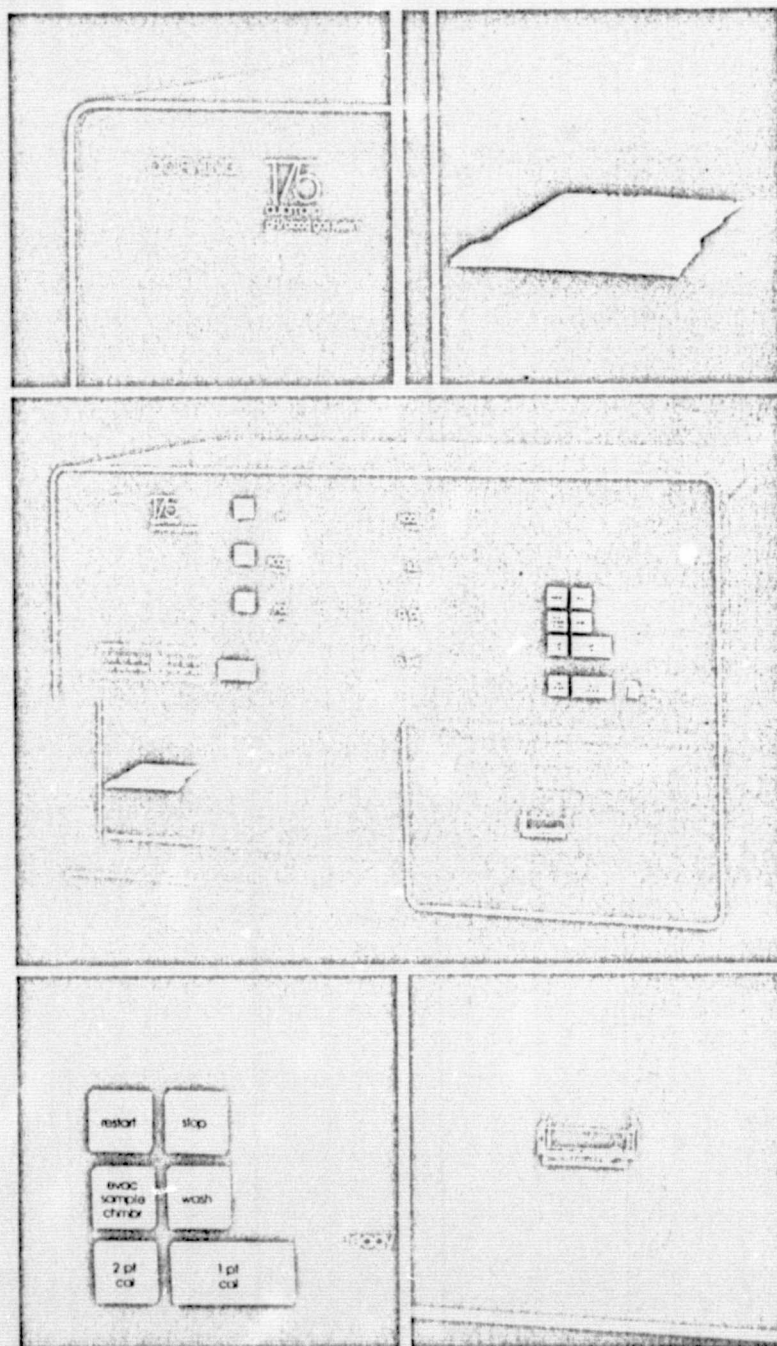
CORNING MEDICAL INSTRUMENTS

Medfield, Massachusetts

IIT RESEARCH INSTITUTE

The Corning 175 Automatic pH/Blood Gas System

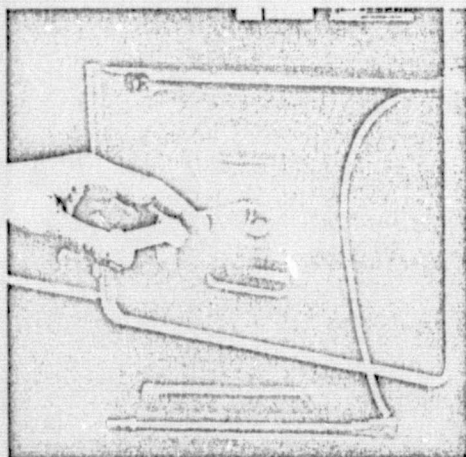
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Corning has combined computer technology with its blood gas expertise to produce the 175 Automatic pH/Blood Gas System—a significant improvement in reliability, accuracy and convenience.

The 175 is the "ready" blood gas system. At 8:00 in the morning, 4:30 in the afternoon, or even 3:00 in the morning, twenty-four hours a day, the 175 is always calibrated—always ready to accept patient samples. So simple to operate, it is ideal for use in any hospital location, by anyone who has a need for accurate blood gas data—fast.

CORNING

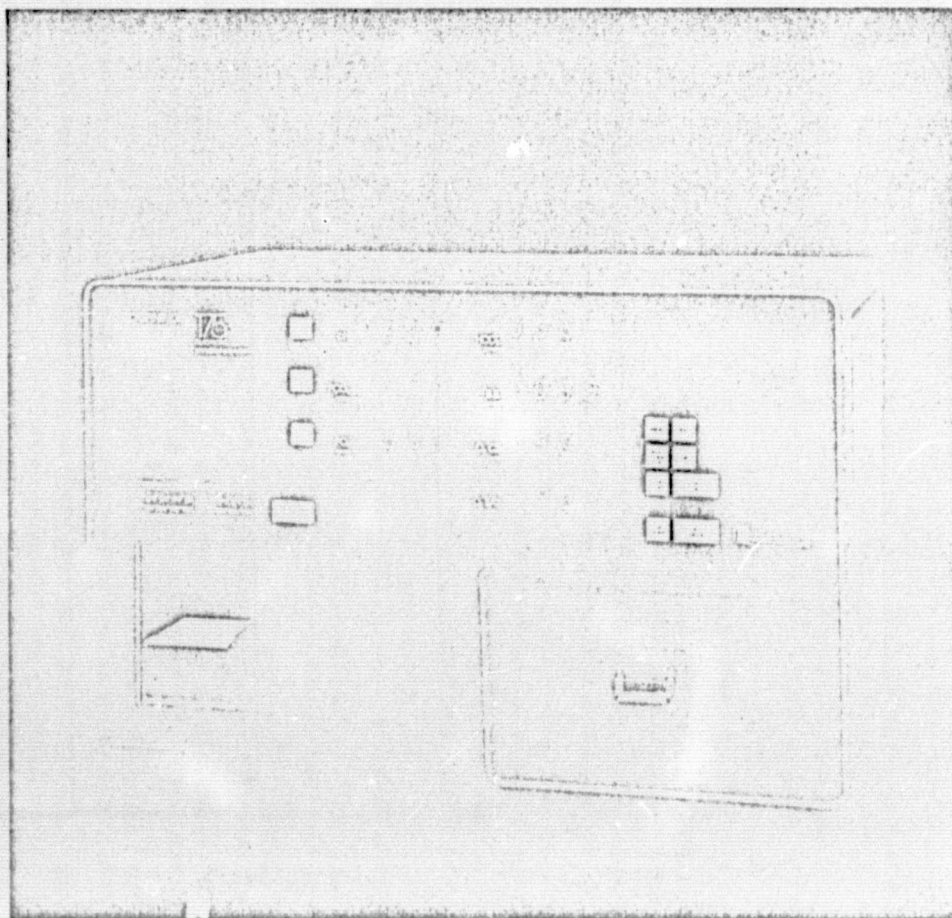
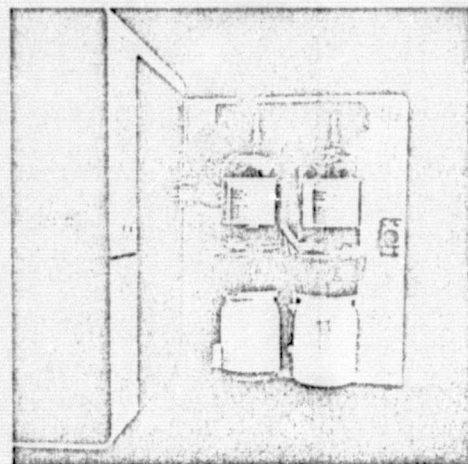


Choice of Sample Size The 175 can accept samples from syringes, vacuum collection tubes or microcapillary tubes. In the capillary sample mode, it will perform accurate analysis on samples as small as 125 μ l. The system not only indicates when it's ready for new samples, but also tells the operator when the sample is in place and when to remove the sampling device. When the SAMPLE IN PLACE display lights, it indicates that the sample chamber is filled and free of interferences caused by bubbles. The 175 uses Corning's proven single-sample measuring system in which all three measuring electrodes measure the same sample. The sample is held in a solid-state electronically-thermostated cuvette at 37°C $\pm$ 0.1°C. After each sample, the chamber is automatically washed and prepared for the next sample.

Automatic Endpoint Detection The 175 detects the endpoint for each measuring electrode—pH, PO₂, PCO₂. Corning has eliminated arbitrary time limits on parameter measurement by incorporating a computer program which actually detects individual electrode response endpoints. Only after the three endpoints are reached does the 175 display the four calculated parameters.

If no endpoint is detected within three minutes a NO ENDPOINT indicator will light for that parameter and calculated values based on that parameter will not be reported. If the operator feels that the value displayed as NO ENDPOINT is indeed an acceptable value, he may override the NO ENDPOINT by pushing the button. At that time the calculated values based on that parameter will be displayed. A red light will remind the operator that he has chosen to accept values which the computer has questioned.

Automatic Calibration The 175 calibrates itself automatically using a built-in barometer, self-contained buffers and calibrating gases. A one point calibration is initiated automatically every half hour. Every two hours, the system performs a two-point calibration. Either of these procedures (which take approximately three and four minutes, respectively) may be interrupted if a "stat" sample must be run. The operator can also initiate either calibration by pushing the ONE-POINT CAL or TWO-POINT CAL button.



The 175 Automatic pH/Blood Gas Analyzer

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Self-Diagnosis The computer in the 175 is constantly monitoring instrument performance. Should any malfunction occur, the operator is immediately informed through a series of panel indicators. Another panel of diagnostic controls enables the operator to use the computer to actually diagnose problem areas. This results in minimal downtime—and ultimate confidence that the values reported are correct.

Adaptable to Patient and Laboratory Needs Not every patient is the same. The 175 allows you to dial in patient temperature and patient hemoglobin and the system automatically displays the corrected values. This is particularly significant in clinical situations (for example hypothermic surgery or severe infection) in which the patient's temperature and/or hemoglobin is abnormal.

Should a laboratory prefer using calibrating gases with composition other than those recommended by Corning, the values for these gases may be dialed into the 175 and the system will calibrate using the entered values. In addition, if the laboratory normally corrects for PO_2 gas/liquid correction factor, this may also be dialed in for automatic calculation into the displayed values.


CORNING


CAT NO. 477638 REV A

Blood Gas Analysis

95% RANGE*

7	•	3	7	pH	7.42 ± 0.04
0	3	8	•	PCO ₂ mmHg	39 ± 7
0	8	6	•	PO ₂ mmHg	91 ± 17
0	2	2	•	HCO ₃ mmol/l	25 ± 4
-	0	3	•	VT BE mmol/l	0 ± 2
0	2	0	•	O ₂ CT ml/dl	20 ± 2
0	9	6	•	O ₂ SAT %	94 ± 2
7	6	4	•	Bar Pres mmHg	
0	3	7	•	°C Pat Temp	
0	1	5	•	Hb g/dl	

* 95% RANGE: pH 7.35-7.45, PCO₂ 35-45, PO₂ 80-100, HCO₃ 22-28, VT BE -2 to +2, O₂ CT 15-25, O₂ SAT 90-100, Bar Pres 100-120, °C Pat Temp 36-42, Hb 12-18.

DATE	DOCTOR	ROOM NO.	ID NO.	NAME
TIME SAMPLE DRAWN				
☐ AM				
☐ PM				
☐ ARTERIAL				
☐ VENOUS				
☐ SYRINGE				
☐ CAPILLARY				
☐ OTHER				
☐ PAT TEMP				
☐ °C				
☐ °F				
REMARKS				

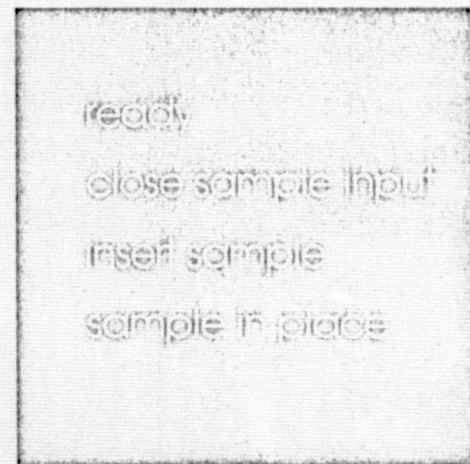
(Actual size 3 1/4" x 8")

Built in Ticket Printer The built-in ticket printer of the 175 provides a permanent, multi-copy record of blood gas values for patient, laboratory, and hospital records. The sophisticated software of the micro-processor constantly monitors many of the 175's electronic and mechanical systems—and should a malfunction occur in any of these systems, prevents questionable measured or calculated parameters from being printed on the ticket. The printed ticket therefore becomes your assurance that

the 175 was operating within its designed specifications when the values were generated.

As an aid to laboratory quality control procedures, the 175 can also generate electrode drift data on a special data card for all calibrations, manually or automatically initiated.

All ticket data is presented on a standard-size format with space available for additional patient/hospital identification and information.



The 175—automation where it counts—so you can use your blood gas system where and when you want. Because the 175 monitors its own performance, it can be used at any time to obtain excellent results with minimal training. The system tells the operator when it's ready, when it's not, and whether all is operating well. It lets the operator know what is happening all the time. The 175 is the ideal system for locations requiring "stat" blood gases anywhere in the hospital. It is ready to use 24 hours a day—and can easily handle 20 to 22 samples per hour—hour after hour.

Instrument Specifications

Reported Parameters:		Range	Resolution
pH		6.5-8.0	0.001 pH
PCO ₂		5-250 mmHg	0.1 mmHg
PO ₂		0-999 mmHg	0.1 mmHg
HCO ₃		0-54.0 mmol/l	0.1 mmol/l
Base Excess		± 30.0 mmol/l	0.1 mmol/l
O ₂ Content		0-64.0 vol %	0.1 vol %
O ₂ Saturation		10-100.0%	0.1 %
Barometric Pressure		550-800 mmHg	1 mm

Operating Voltage: 100/115/200/230 VAC ± 10%,
50/60 Hz (Preset at factory)
450 watts

Operating Ambient Temperature: 15.6-32.2°C (60-90°F)

Operating Relative Humidity: 5-95%

Operating Barometric Pressure: 550-800 mmHg
Accuracy: ± 4 mmHg

Sample Chamber: Temperature Range:
36°-38°C
Temperature Equilibration Time:
90 seconds for 0.5 ml sample @ 4°C
Temperature Stability:
± 0.1°C

Sample Size: Syringe or vacuum tube—500 µl
Micro capillary—125 µl
Micro syringe—200 µl

Dimensions: Height: 47.0 cm (18.5 in.)
Width: 69.2 cm (27.25 in.)
Depth: 50.8 cm (20.0 in.)
Weight: 61.7 kg (136 lbs.)

Option: Computer interface output available.

Corning Medical
Corning Glass Works
Medfield, Massachusetts 02052, U.S.A.
Tel: 800-225-3850

Corning Medical
Halstead
Essex England CO9 2DX
Tel: (07874) 2461
Telex: 98204, Cable EEL Halstead

Corning Medical
9-20 Akasaka, 1-Chome
Minato-Ku, Tokyo, Japan
Telex: 781-22165

CORNING

CORNING

Corning Medical
Instruments
Corning Glass Works
Medfield, Massachusetts 02052
Tel: 617-359-7711

175 Automatic
pH/Blood Gas System

EFFECTIVE: OCTOBER 1, 1975

PRICE LIST

CAT. NO.	DESCRIPTION	CORNING SUGGESTED RETAIL PRICE
475175	175 AUTOMATIC pH/BLOOD GAS SYSTEM, for the determination of pH, PCO₂, PO₂, and automatic calculation of Bicarbonate, Base Excess (Delta Content), O₂ Content and O₂ Saturation. Complete with all necessary electrodes, reagents, and supplies necessary for immediate start-up, excluding calibrating gases and regulators. Auto- matic correction for patient temperature, hemoglobin and barometric pressure. Built-in multiple-copy ticket printer. Free one year warranty, installation, and customer training included. Contact your local Corning Medical Service Representative for information on preventive maintenance agreements.	\$ 17,900.00
477975	CALIBRATING GAS KIT for use with the 175 Automatic pH/Blood Gas System, includes one disposable "E-D" cyl- inder of 5.00% CO₂, 12.00% O₂, Balance N₂, (No. 477434); one disposable "E-D" cylinder of 10.00% CO₂, Balance N₂, (No. 477438); two two-stage pressure reducing regulators (No. 477974); two cylinder base supports (No. 477641), connecting tubing, and cylinder wrench. RECOMMENDED CALIBRATING GASES FOR Pco₂ AND Po₂ ELECTRODES: No Deposit, No Rental disposable gas cylinders, provision made for disposal at customer's discretion either locally or through Corning with shipping labels supplied. One to 11 empty cylinders return to shipping point freight prepaid; 12 or more can be shipped collect. Guaranteed Uniform Assay — Replacement tanks are supplied with the same composition as the one before. Analysis is guaranteed to be within ±0.01 mole per cent of the stated composition. Size Available — Cylinders available are "E-D" size, containing 20 standard cubic feet @ 2200 psig. Empty weight: 8 lbs.	445.00
477434	5.00% CO ₂ , 12.00% O ₂ , Balance N ₂ , Disposable "E-D" cylinder	62.00
477438	10.00% CO ₂ , Balance N ₂ , Disposable "E-D" cylinder	48.00
477974	Preset, two-stage regulators with standard medical post yoke for use with "E" and "E-D" cylinders	150.00
477641	Base support for "E" and "E-D" cylinders	25.00

Additional gas compositions and mixtures are available.
Ask your Corning Medical Representative for details.

CAT. NO.	DESCRIPTION	CORNING SUGGESTED RETAIL PRICE	
		\$/CASE	\$/UNIT

STANDARDS AND SUPPLIES

477969	Bulk Reagent and Supplies Kit • Saves 10% over individual piece suggested retail price. Contents: 2 cases 7.382 buffer (No. 477073) 1 case 6.838 buffer (No. 477068) 5 cases flush solution (No. 477991) 2 KCl donut kits (No. 477966) 1 bottle KOH (No. 477634) 1 bottle electrode cleaning solution (No. 477009) 1 bottle 4 molar KCl solution (No. 477428) 1 PO ₂ membrane kit (No. 477997) 1 PCO ₂ membrane kit (No. 477990) 1 reference membrane kit (No. 477378)		\$ 469.00
477073	Blood buffer, pH 7.382, 475 ml	\$ 99.00/12	\$ 8.25
477068	Blood buffer, pH 6.838, 457 ml	87.00/12	7.25
477020	PCO ₂ electrolyte solution, 475 ml	120.00/12	10.00
477019	PO ₂ electrolyte solution, 475 ml	120.00/12	10.00
477428	4 molar KCl solution, 125 ml, unsaturated	18.00/6	3.00
477991	Flush solution concentrate (6 pack of 125 ml bottles)	20.00/6	
477009	Blood pH electrode cleaning solution, 475 ml	120.00/12	10.00
477656	PO ₂ electrode cleaning compound, 15 grams	21.00/6	3.50
477634	Potassium Hydroxide, 1 N, 235 ml (for cleaning pH and PCO ₂ electrodes)	45.00/6	7.50
477966	KCl donut kit for reference electrodes (contains 6 donuts)		8.00
477998	Micro blood collecting tube kit, contains 50 heparinized blood collecting tubes, tube caps, fleas and magnet		25.00
477638	Blood Gas Analysis Report Cards, quantity 900		49.50
477970	Blood Gas Calibration Report Cards, quantity 900		49.50
477978	Capillary adaptor kit, (for use with the micro blood collecting tubes) contains 100 adaptors		18.00
477976	Vacuum tube sampling kit (contains 12 devices)		3.50

ELECTRODES AND ELECTRODE SUPPLIES

477968	Replacement/Back-Up Electrode Kit • Saves 15% over individual piece suggested retail price. Contents: 1 PO ₂ electrode with membrane kit (No. 476175) 1 PCO ₂ electrode with membrane kit (No. 476208) 1 pH electrode including installation kit (No. 476209) 1 reference electrode internal (No. 477386)		580.00
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CAT. NO.	DESCRIPTION	CORNING SUGGESTED RETAIL PRICE	
		\$/CASE	\$/UNIT
476175	PO ₂ electrode with membrane kit (No. 477997)		\$ 220.00
476208	PCO ₂ electrode with membrane kit (No. 477990)		235.00
476209	pH electrode complete with instructions and installation kit		190.00
477386	Reference electrode internal		38.00
477990	PCO ₂ membrane kit (contains 12 membranes, spacers, "O" rings and boots)		32.50
477997	PO ₂ membrane kit (contains 12 membranes, "O" rings and boots)		32.50
477378	Reference electrode membrane kit (contains 12 membranes, "O" rings and seals)		35.00
477977	"O" ring fixture assembly including one each No. 477996 and No. 471393 conical "O" ring guides		49.50
477996	Conical "O" ring guide for use with PCO ₂ electrode		8.00
471393	Conical "O" ring guide for use with PO ₂ electrode and reference electrode shell		8.00
477024	Pointed tweezer, steel		7.50
471381	Reference cap assembly		16.50
476004	Reference shell assembly		8.00
477995	Reference retainer nut		6.50
ADDITIONAL RECOMMENDED ACCESSORIES			
477993	Instruction manual		26.00
477973	Sample entry tubing kit (contains 5 sets)		5.00
477986	Push button lamp kit (contains 12 lamps)		20.00
477971	Solenoid tubing kit (contains 1 set)		25.00
477967	Cooling fan filter kit (contains 1 set)		7.50
477980	Shorting strap kit (contains 1 set)		21.00
477982	Waste trap filter kit (contains 2 sets)		15.00
477981	Check valve kit (contains 3 valves)		20.00
477985	Vacuum tube seal kit (contains 3 seals)		7.50
477999	Humidifier tube kit (contains 1 set)		16.00
477988	Clot removal device kit (contains 12 adaptors)		18.00
477994	Bottle, wash/waste		7.50

Prices subject to change without notice.

INTRODUCING

The New IL446

^{TOTAL}
Cl/CO₂

Electrolyte Analyzer

©1985

The New

Na/K/Cl/^{TOTAL}CO₂

AUTOLYTES™ System

©1985



Instrumentation Laboratory Inc.

Instrumental Laboratory Chloride and CO₂ analyzer

446

Cl

100%

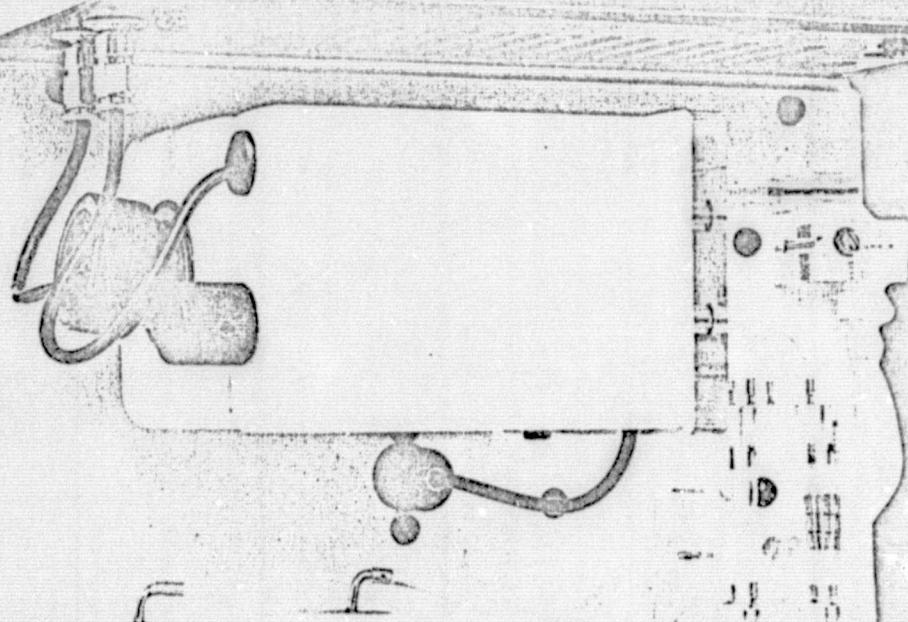
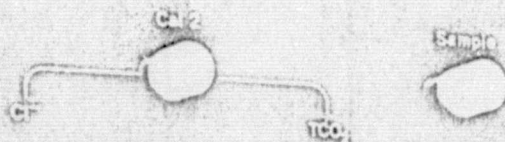
100%

100%

AutoCl

Cl₂

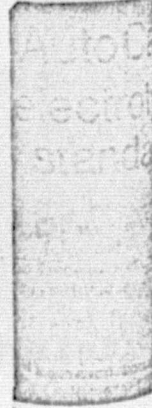
Sample

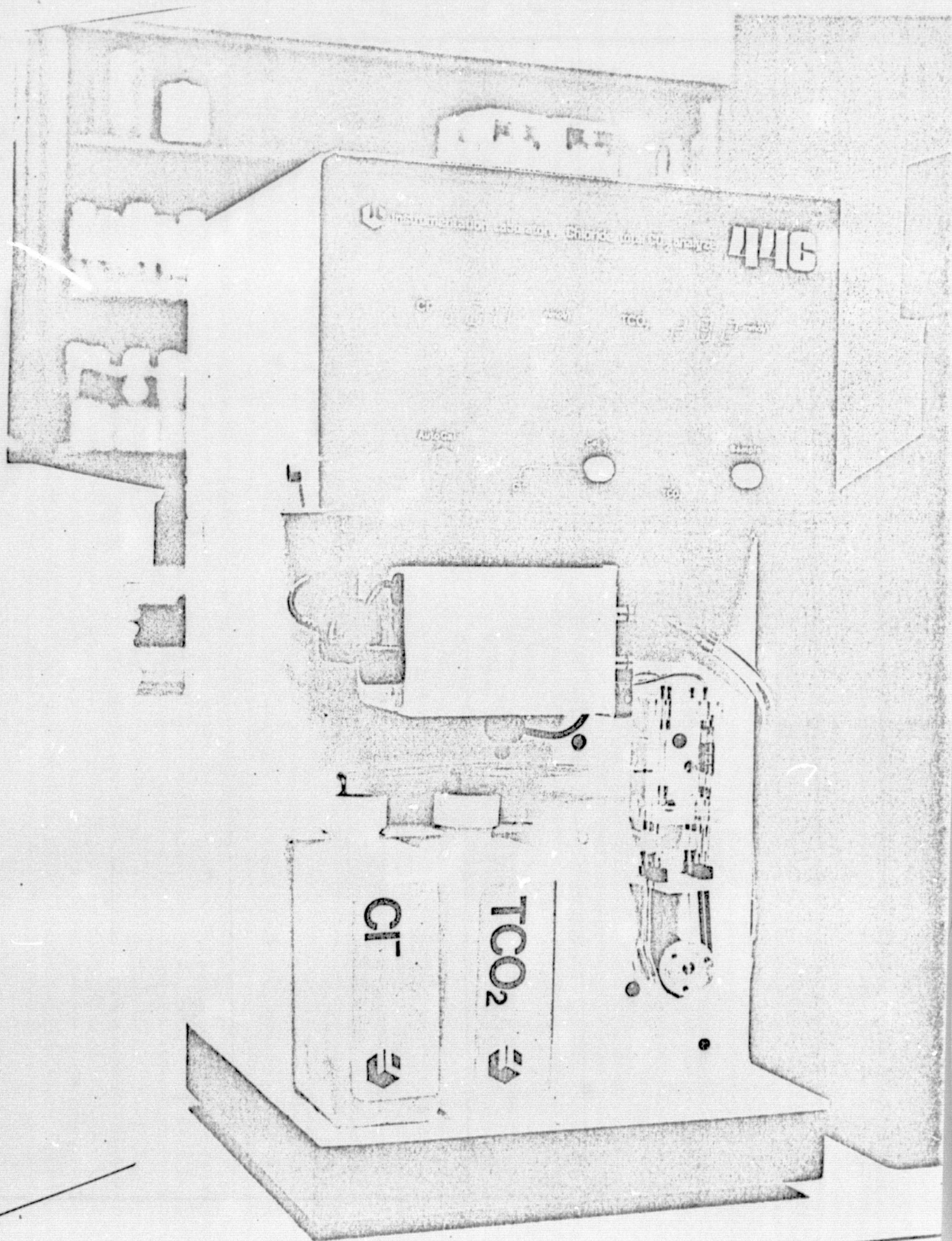


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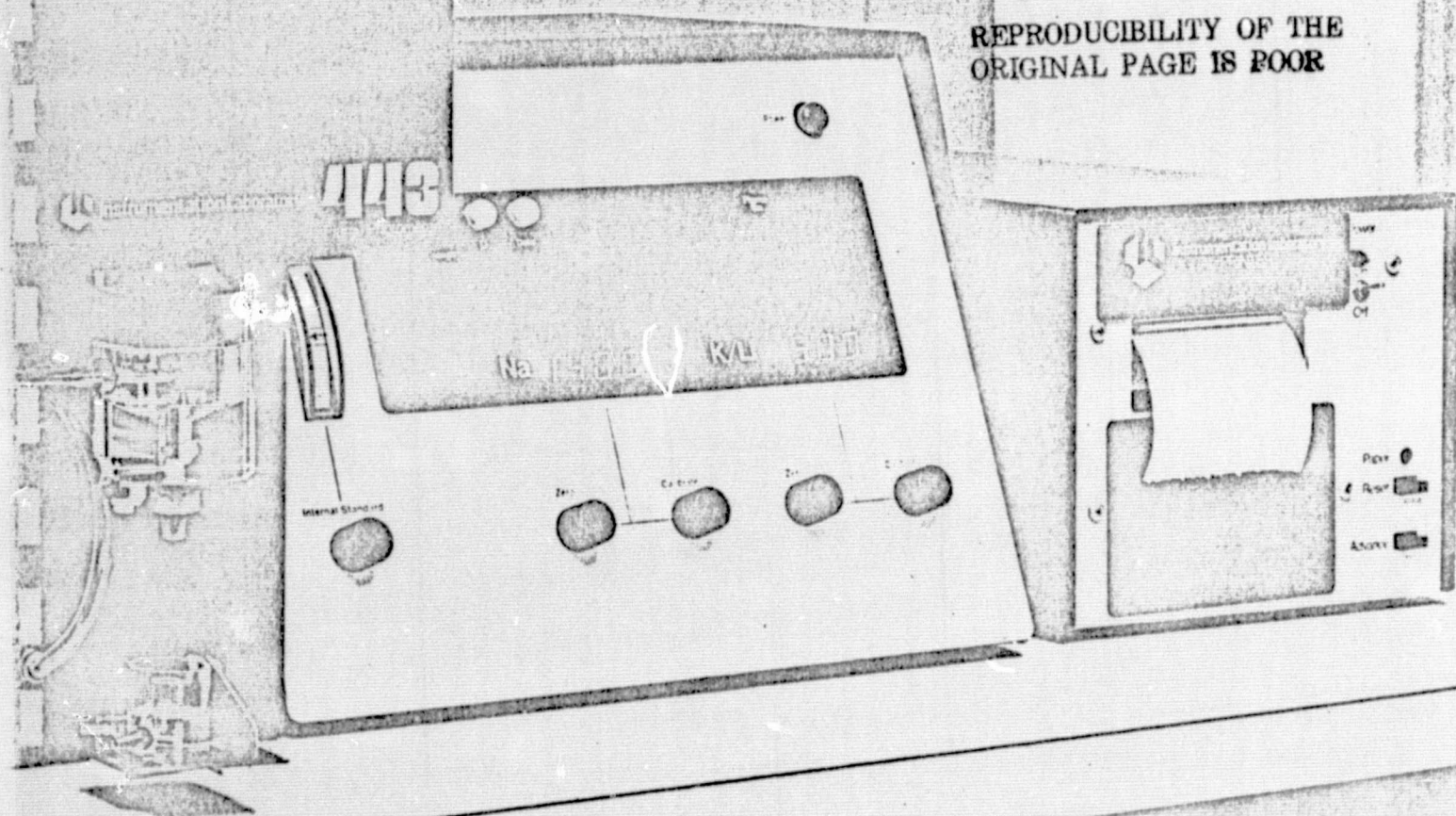
Cl

TCO₂





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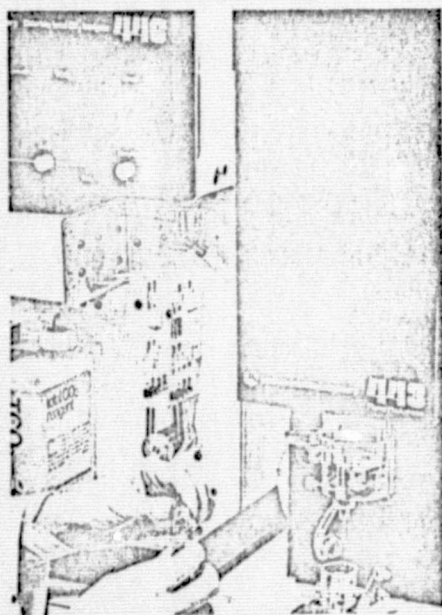
More on IL's Total Electrolytes

2 & 4-Channel Electrolyte Analyzers

IL446 automatically measures Cl and Total CO_2 from a single serum or plasma sample, in a simple 1-step pushbutton operation of less than a minute. The IL AUTOLYTES System automatically measures Na/K/Cl/ TCO_2 simultaneously, from a single sample for increased ease of operation and faster turnaround results.

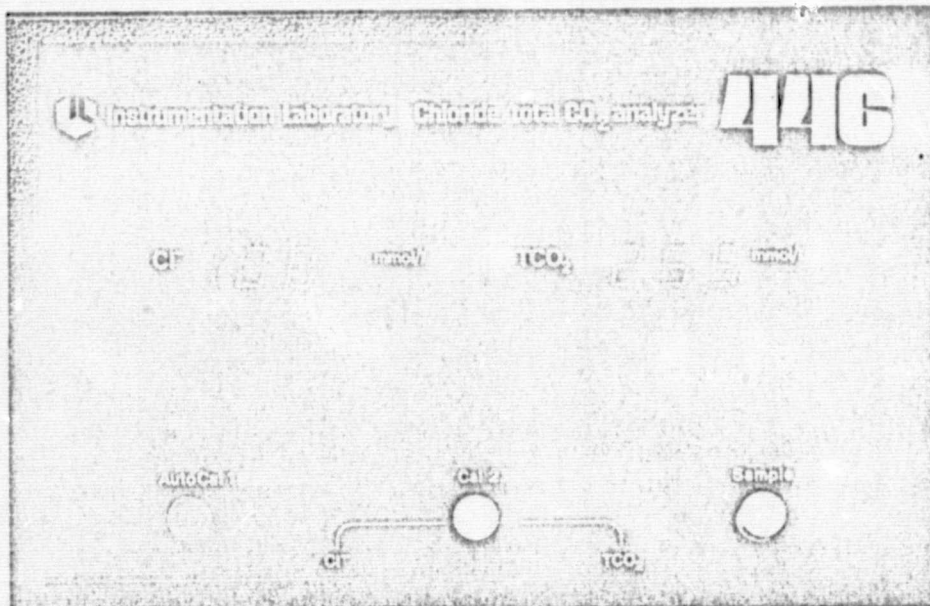
Flexibility

The IL446 is designed for use both as a stand-alone Cl/ TCO_2 Analyzer and as a compatible add-on instrument to interface with either the IL343 or IL443 Flame Photometer. The interfaced configuration provides a full 4-channel Na/K/Cl/ TCO_2 electrolytes system with complete flexibility for separate Na/K and/or Cl/ TCO_2 determinations, depending on changing lab test requirements. All current IL343/443 customers can enjoy a considerable cost advantage by only purchasing the IL446 and have full 4-channel electrolyte capability.



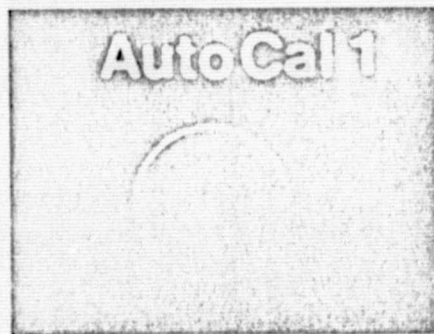
Visual Monitoring

The IL446's clear, see-through TCO_2 cuvette allows internal visibility to assure proper operation for troubleshooting. The Cl cuvette is also readily accessible and transparent for convenient visual checking, allowing for easier self-servicing and less downtime.



Simple Operation

3 pushbutton controls on the IL446 provide automated determinations. Aspiration and calibration are automatic. Manual sample diluting is eliminated to provide increased accuracy and aspiration can be from any type vessel allowing complete flexibility. Changes in normal laboratory routine are not required. With the IL AUTOLYTES System (following calibration) a 1-step pushbutton procedure displays and prints all 4 values, simultaneously.



Methodology

The IL446 measures chloride by the modified Zall technique—a standard, reference colorimetric mercuric thiocyanate method; total carbon dioxide is measured directly by a Pco_2 electrode rather than by derived calculation for improved accuracy. The IL Flame Photometer—leader and standard of the industry—measures Na and K by a standard flame emission technique.

Stat Readiness

In standby mode, instrument fluids are continuously circulated in the IL446 to assure stat results in 51 seconds after calibration. This eliminates start-up delays without wasted reagents.

Data Presentation

The large, easy-to-read electronic LED displays show all values simultaneously in mmo l/l. Data remains locked on the readout panels until the start of the next test to provide the operator with as much time as necessary for data taking—especially useful in those busy labs or in stat situations. The IL Automatic Printer provides hard copy on all values to avoid all transcription errors along with positive sample identification.

Automatic Fault Warnings

To assure accuracy, electronic monitoring circuits illuminate warnings on the IL446 display panel to identify membrane leaks, low temperature and power fault conditions. Also, LED flashes on and off to indicate that instrument is unable to autocal. The automatic safety warnings on the IL Flame Photometer identify gas, air or flame fault conditions. In addition, an LED check confirms that all digit segments are operative to insure the operator's reading the correct value on the electronic displays. All these automatic fault/warning systems serve to prevent the operator from using any data until condition has been rectified.

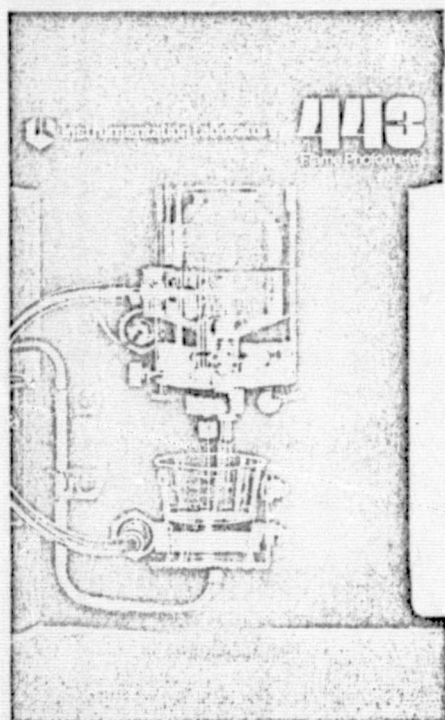
Capability

Advanced Electronics

Solid state design includes integrated circuit chips to reduce power consumption and electricity costs and increase operating reliability. Printed

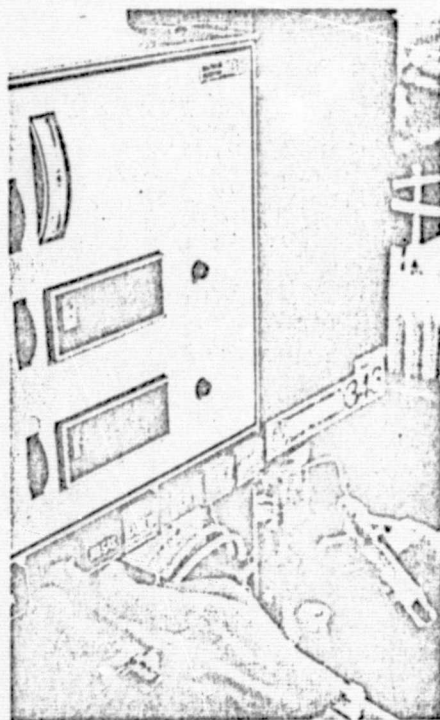
circuit boards and internal components are readily accessible for fast removal and replacement by qualified service engineers to minimize down-time costs.

IL Flame Photometers



IL443

IL's latest flame photometer has a large, 4-digit LED readout, built-in lithium and auto-printer outputs, 1 μ l microsampling, automatic curve correction on all channels, internal standard for increased accuracy and simple pushbutton operation. It provides Na/K determinations in only 7 seconds.



IL343

This model in the noted IL flame line offers the user fast, accurate analysis of Na, K and Li and features lighted pushbutton controls and an internal dilutor for simplified operation. Current users of the IL343 can, by adding the new IL446 (plus accessories where applicable), upgrade their electrolyte instrumentation to full 4-channel capability at minimal additional cost.

Accessories

IL Digital Printer

11-column digital printout with Li determinations in red ink, Na/K/Cl/TCO₂ in black. 8½ in. wide, 14 in. long, 7 in. high, weight 16½ lb. Eliminates manual recording of patient data to increase transcription accuracy and serves as a data back-up unit should readout display malfunction.

IL444 Automatic Dilutor

Mixes sample with distilled water and internal standard concentrate at a ratio of 1:200, and displays results on flame photometer in 17 seconds. Increases speed and precision, eliminates premixed blank solutions, calibrated glassware and special dilution procedures.

Air Compressors

New, quiet IL24352-04 (diaphragm-type) operates on 115 V, 60 Hz and delivers 0.47 scfm at 30 psig. IL24352-02 (piston-type) operates on 220 V., 50 Hz. IL24352-03 (piston-type) operates on 110 V., 50 Hz.

All 3 compressors are compatible with any IL Flame Photometer, according to specified voltage requirements.

Laboratory Air

For lab air applications, the IL27457-02 Air Filter & Regulator Assembly is available.

Supplies

Flame Standards

Available in 140/5, 160/8 and 120/2 mEq/l, in color-coded boxes of 50 Na/K 1 ml ampules. This convenient packaging eliminates waste, contamination and pouring from large storage bottles. The disposable ampules snap open easily for direct introduction of standard to instrument. All 3 standards are viscosity-adjusted, and are also available in 500 ml bottles if desired. Ampule standard tested against NBS electrolyte serum reference material.

Reagents

Also available from IL are Autocal 1, Autocal 2 and Equilibration Solutions, and Cl/TCO₂ reagents.

For more information...

To arrange a demonstration of IL electrolyte instrumentation, contact your local IL Representative. Write or call IL direct.

The Toll-Free number is 800-225-1481.

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The IL446 ^{TOTAL} Cl/CO₂ Electrolyte Analyzer

Featuring automatic pushbutton operation, IL's new 446 measures chloride and total carbon dioxide in plasma and serum samples in less than a minute. Fully compatible design and electronics provide for immediate, plug-in interfacing with any new or existing IL343 or IL443 Flame Photometer, forming a complete 4-channel Na/K/Cl/TCO₂ electrolyte analyzer system with automatic printout to totally automate your electrolyte needs at minimal cost, as illustrated at left.

Simultaneous stat results in 51 seconds.

Automatic fault detection and warning systems prevent spurious test results.

Pushbuttons speed and simplify operation.

Automatic sample aspiration for consistent reproducible results.

Automatic calibration for increased ease of operation.

Large electronic LED readout with lock-on display holds data for reference until start of next test.

Direct measurement of Total CO₂ by Pco₂ electrode for improved accuracy.

Cl measurement by standard colorimetric method using thiocyanate technique.

Stat operational readiness assured by continuous circulation of fluids in standby mode eliminates start-up problems.

Automatic dilution for increased accuracy.

Sample and standard throughput 60 per hour.

Interfaces easily with IL Flame Photometer to form complete low-cost 4-channel electrolyte system to provide increased flexibility.

The IL4-Channel ^{TOTAL} Na/K/Cl/CO₂ AUTOLYTESTM System

The flexible modularity of each IL component provides many operating advantages and cost savings. Current users of the IL343 or IL443 Flame Photometer need only add the new IL446 and the IL Digital Printer accessory to their laboratory instrumentation to achieve full 4-channel capability to automate their electrolyte test needs. And depending on workload needs, they can use either analyzer separately for Na/K tests only, for Cl/TCO₂ tests only, or they can use both together to determine all 4 electrolyte values simultaneously from a single, automatically aspirated sample at a throughput rate of 60 samples per hour for increased speed of operation.

No manual sampling or diluting for increased accuracy and easier operation.

Sample or standard throughput: 60 per hour.

Positive sample identification on printout to eliminate transcription error.

Modular flexibility allows interchangeable 2-channel or 4-channel use as needed.

All 4 values simultaneously from a single, automatically aspirated sample.

Independent readout and printout systems display results for all 4

channels; readout serves as a back-up system for the printer.

Minimum operator training.

Simultaneous stat results in 51 seconds.

Automatic fault detection and warning systems prevent spurious test results.

Full 4-channel electrolytes testing at significant cost-per-test savings.

Pushbutton operation for increased efficiency.

Lowest-priced 4-channel system currently available.

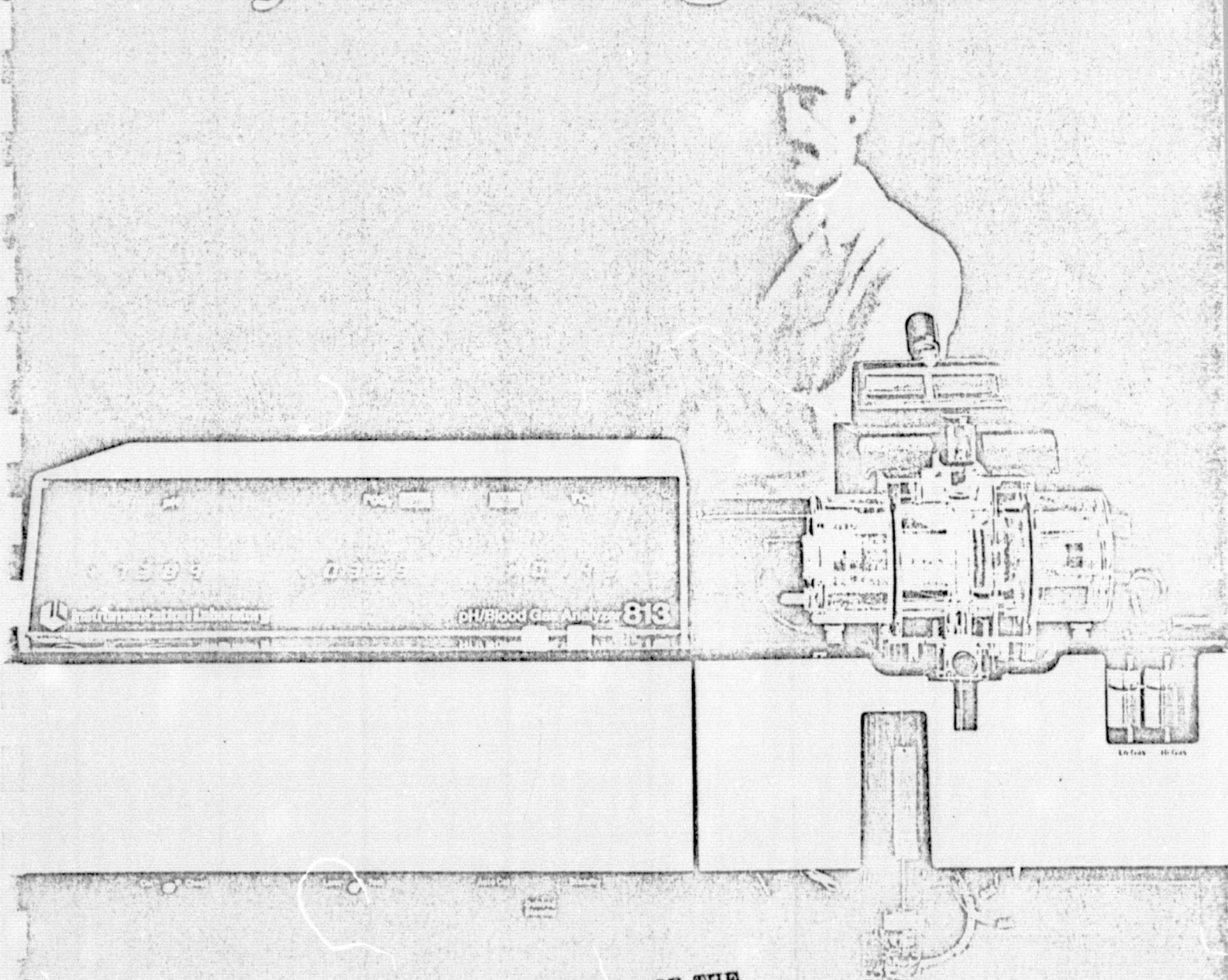
Accommodates serum, plasma, urine and CSF samples.

INSTRUMENTATION LABORATORY, INC.

Lexington, Massachusetts

IIT RESEARCH INSTITUTE

The only automatic
blood gas analyzer
that respects
your intelligence.



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Introducing the IL813.

As work loads on laboratory and specialized patient care teams have grown, manufacturers of health care instrumentation countered their burden with automation and more rapid throughput. In this way, skilled personnel became more effective and efficient. Better care became available to more patients.

But because of the critical nature of blood gas analysis, accuracy must remain the paramount concern. It is for this reason that total automation must always be coupled with the capability for ultimate operator interaction. It is for this reason that IL has developed the IL813. The only blood gas analyzer that provides the optimum mix of intelligent automation and essential operator control.

With the IL813, where automation is desirable, you have it — continuous calibration, automatic sample introduction, self-cleaning, and fault detection. Where hands-on interaction is essential, you have it — correction of pH and blood gas values to actual patient temperature, changing calibration gases, or completely manual operation in an emergency.

No other blood gas analyzer can make this claim.

Intelligent automation — how it works.

In normal operation, blood gas analyses on the IL813 are totally automatic: Introduce a sample. Wait seconds for the display of measured results. Evaluate. Push the Calculate button (not necessary with the printer option). Evaluate the display of calculated results (no wait). Elapsed time, 72 seconds. No interaction required, and the IL813, after a thorough automatic cleaning cycle, automatically

updates its calibration and is ready for the next sample. This automatic calibration is updated continuously five times a second, so the 813 is always ready. Nothing could be simpler, or more precise.

But while automation is beneficial, operator judgment and interaction can still be critical. A sensor indicates a bubble and flags attention. Is it critical to the measurement? Only the operator can decide, and only the operator can do something about it. With the IL813, this decision can be made quickly because its measuring chamber and sample-handling components are clearly visible and readily accessible. If a bubble is a problem, the operator can clearly see it and move the sample to eliminate it.

Or when there are reasons to correct pH and blood gas values to the patient temperature, the operator can quickly dial in the actual temperature. Then, after the sample has run, the IL813 automatically reverts back to standard 37°C. No chance for a busy operator to forget changing back. Moreover, the IL813 reports the values at both the corrected and standard temperatures. That's the optimum combination of essential operator interaction and intelligent automation at work.

Continuous automatic one-point calibration.

Electrodes and membranes age through normal use. This is a principal cause of inaccurate measurement. These changes in electrode characteristics over time are unpredictable and must be compensated for by continuous one-point calibration. The IL813 automatically updates its

calibration five times every second. So when time and accuracy are paramount, there's no waiting and no wondering. The IL813 is always "right on" for every sample. That's intelligent automation.

Operator-initiated two-point calibration.

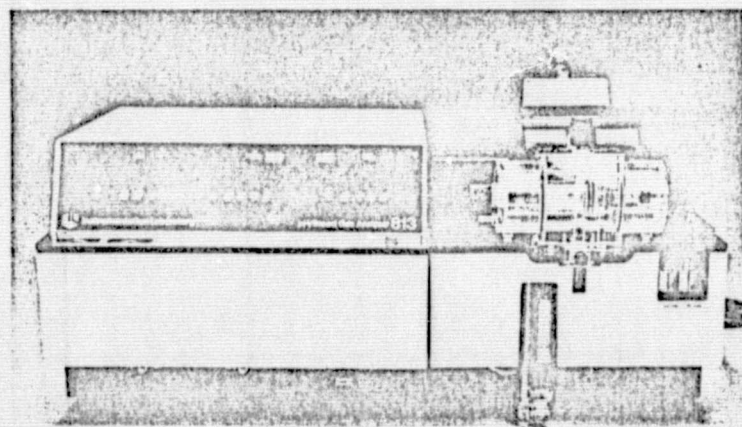
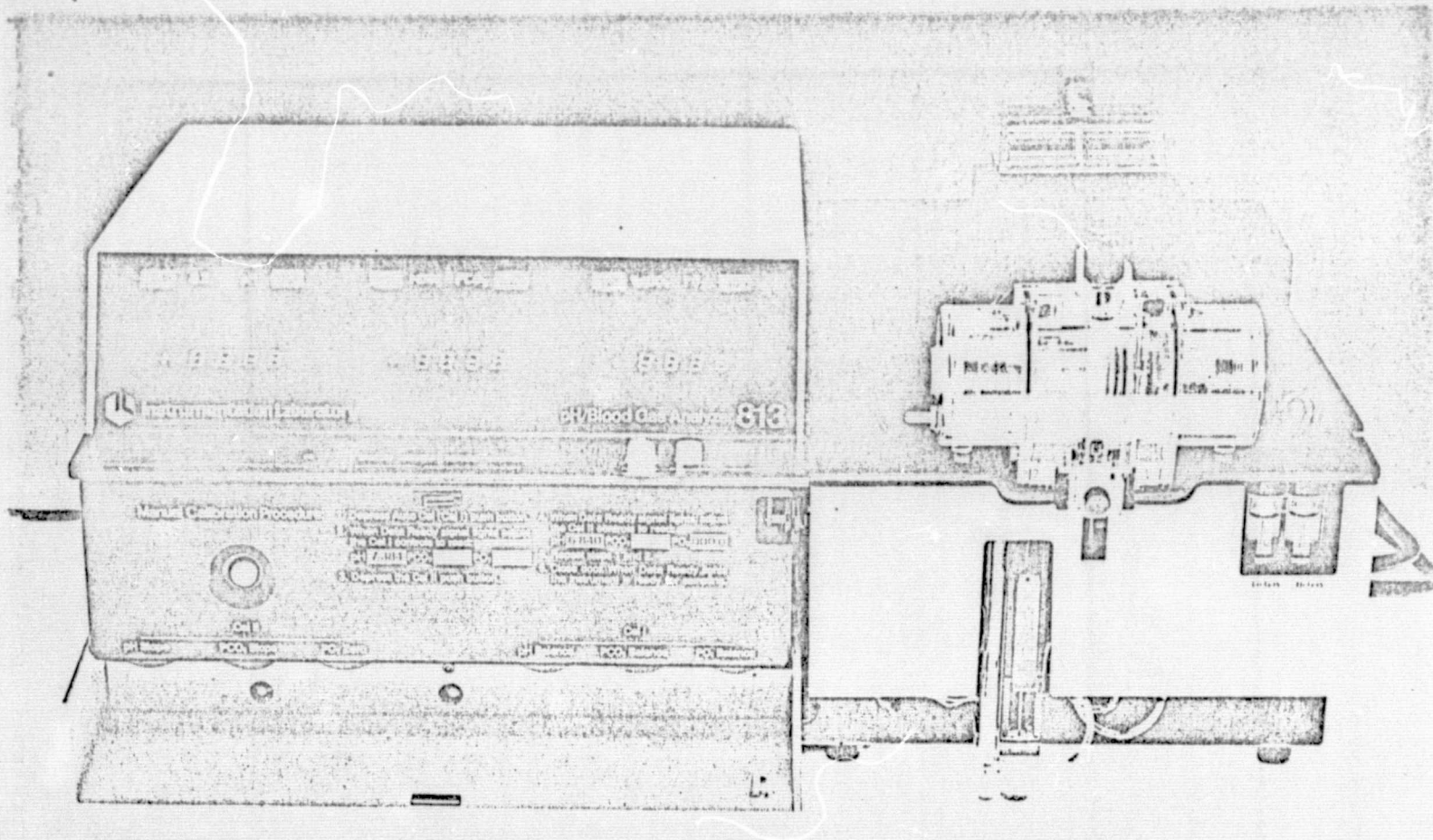
In theory, only a single careful initial two-point calibration should be necessary for each electrode. But that's theory. Actually, electrodes crack, membranes stretch or rupture, electrolyte concentrations change, reference electrode potentials shift, contamination occurs. These all can cause changes in calibration points.

That's where manual two-point calibration comes in. If these values are off, there must be a cause and a cure. Automatic electronic compensation provides neither correction nor remedy. It simply masks and perpetuates the problem.

But an operator performing a two-point calibration — whether routinely or as part of a quality control routine or because of suspicious values or a malfunction — can use judgment during the process. If there's a problem, it can be quickly detected and corrected. And only with the IL813 can this be done.

What's more, manual two-point calibration is a simple procedure. It must be done with care, but once done, the panel door can be closed and locked to prevent tampering.

And if test conditions call for a different standard, say 50 or 95% oxygen rather than 20% (as for shunt studies), recalibration for the new gas standard is a simple one-step process. That's optimum flexibility.



The IL813, showing all data and fault detection displays. With front panel down, both one- and two-point calibration can be controlled by the technologist. Normally, one-point calibration is updated automatically by the instrument five times per second. Two-point calibration should be checked once a day and reset manually if necessary.

Below, the 813 in normal operation with front panel locked. Sample is aspirated behind red flap, lower right. Results appear in 72 seconds.

The inside story.

From its solid-state electronics and light emitting diode displays to its clearly visible, accessible processing components, the IL813 is the essence of reliability and simplicity. Working parts such as valves and solenoids have been reduced to an absolute minimum. (Murphy's law has little chance to operate.) All functional components, tubing, and reagent containers are within convenient reach, not concealed behind opaque, hard-to-remove panels.

Moreover, should a malfunction occur, manual operation is possible. Samples can still be run. And if repairs should be necessary, they usually can be done by the user right in the laboratory, because of the 813's modular design. So downtime is minimal. The 813 is always ready.

Dynamic self-diagnostics.

Proper function is the key to accurate data. Busy operators have no time to run routine checks on

critical system components or reagent condition. Nor can even the best eyes detect a minute membrane rupture or a noisy electrode due to high impedance electrode fractures.

These inevitable sources of malfunction are better detected continuously and automatically. That's why the IL813 is continuously diagnosing the presence of bubbles in the sample, waterbath temperature, solution levels, membrane integrity, and electrode performance. Where the stakes are high, IL813 diagnostics leave nothing to chance, and help keep operator uncertainty to a minimum.

Data and fault detection displays.

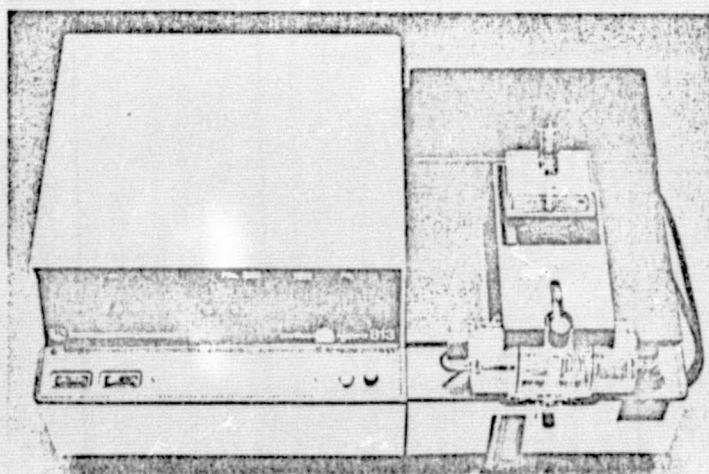
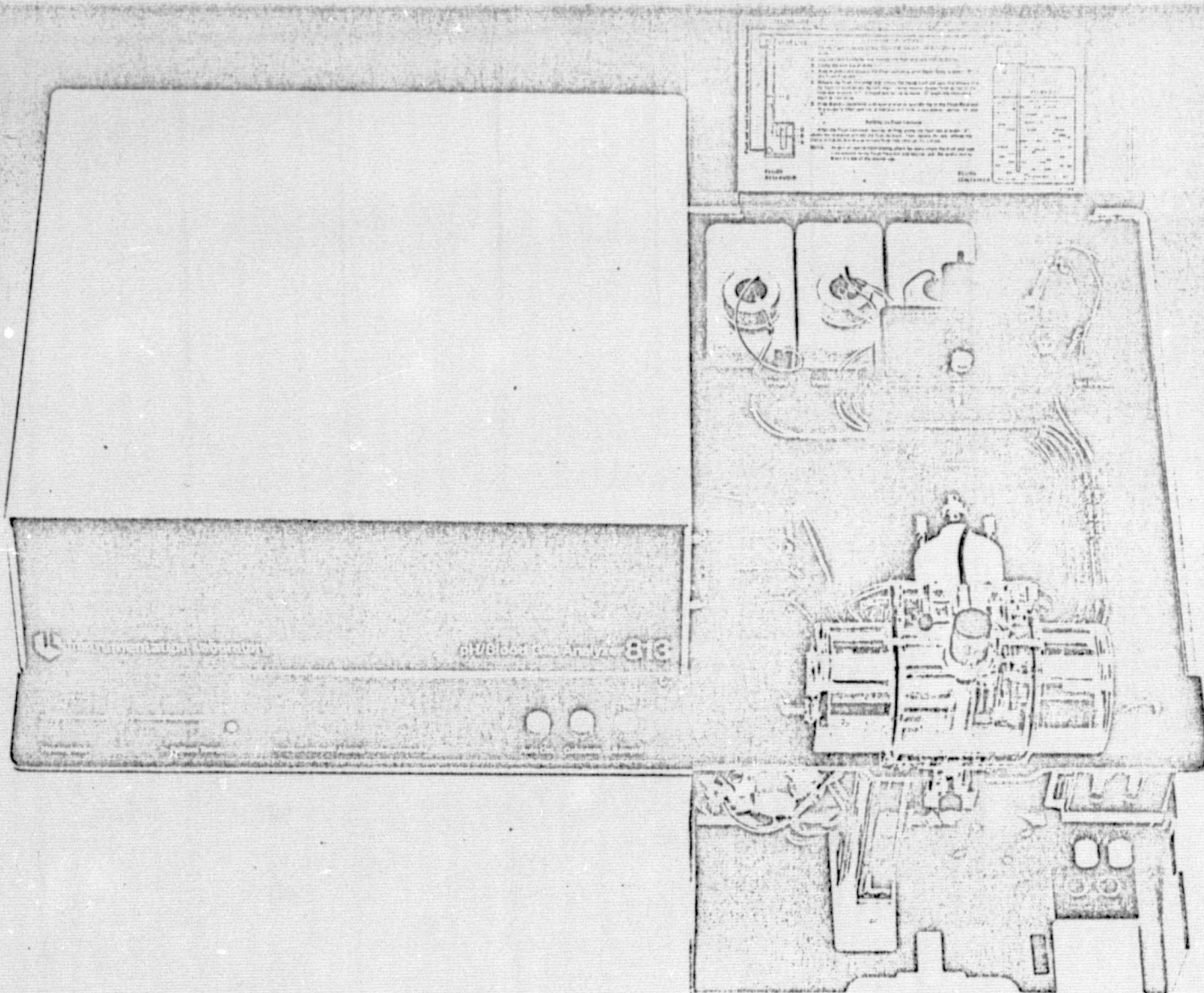
Adequate, accurate information is essential to proper treatment. The IL813 automatically provides four different kinds of information in the displays. One, all measured and calculated results (no printer necessary). Two, all calibration values and operator-entered data.

Three, any of six possible malfunctions. And four, electrode problems (indicated by the corresponding readout flashing during calibration mode).

In the case of an alarm signal, no transfer of information to the printer occurs. This prevents the inadvertent recording of incorrect results. All data, however, does appear on the LED displays so no essential information is omitted or lost. This is the intelligent approach to automated fault detection.

Respiratory gas measurement.

The IL813 can also be used routinely to measure respiratory gases. For instance, analysis of a fixed volume of expired air (in a Douglas bag), coupled with an analysis of blood samples, allows calculation of shunts and oxygen consumption. Thus, yet another example of IL813 flexibility and the basic wisdom of operator-interaction capability.



With top panels open nothing is hidden, allowing the technologist to perform easy repairs. Note simple modular design using a minimum of solenoids and tubing and just a single valve.

Below, the 813 in normal operation, top panels closed.

IL813 performance.

Measuring O₂ saturation.

The IL813 *does not* calculate oxygen saturation, and for a very good reason. Blood gas measurements (P_{O₂}, P_{CO₂}, pH) do not provide sufficient information to calculate O₂ saturation except in normal, healthy people. This is because 2-3 diphosphoglyceric acid and carbon monoxide, as well as other variables not analyzed by a blood gas instrument, can significantly affect the dissociation curve. A complete explanation of this phenomenon can be found in "Adaptive, Genetic, and Iatrogenic Alterations of the Oxyhemoglobin-dissociation Curve" by Shappell & Lenfant (*Anesthesiology*, V37, No. 2, August 1972), reprints of which are available from IL.

The sole conclusion one can draw from this data is that the responsible determination of O₂ saturation can be accomplished only by direct measurement.

Patient temperature correction and microsampling.

Blood gas values are temperature sensitive. Thus, we designed the IL813 so an operator can insert actual patient temperature for a sample, and results are corrected to this temperature, assuring accurate data. Moreover, after the sample has been run, the IL813 automatically returns back to the standard 37°C for the next test. No chance for operator oversight. And readings for both temperatures are reported either with a push of a button or automatically with the optional printer.

If a 500 µl blood sample is unobtainable, the IL813 will also accurately analyze a microsample. By the push of a button the instrument is programmed to allow microsamples from a capillary tube to be introduced. Still another example of IL813 versatility and the intelligent combination of automation and operator control.

Quality assurance.

Quality assurance means reliable performance — the continuous production of highly accurate results. The IL813 can give that kind of performance — because of both its basically simple, trouble-free design and our unique IL User Support Program. This includes:

1. The IL Guaranteed Performance Installation by IL service engineers, plus on-site operator training.
2. The IL 4-day Quality Assurance Seminar for complete familiarization with the IL813.
3. The IL Toll-Free Hot Line for instant technical and maintenance help.
4. The IL Field Service Team, providing both service and applications assistance across the country.
5. The IL Warranty, a one-year warranty against defects in manufacture and materials, backed by IL's experience and reputation as a leading manufacturer of health care instrumentation of the highest quality.

Printer option.

Not all applications require a printed readout. For those that do, the IL318 Blood Gas Ticket Printer is an easily connected option. The ticket is a readily fileable, three-part form. Since patient identification and other pertinent information are entered on it, in addition to all six measured and calculated blood gas values (the latter automatically), there is little chance of mixup or misfiling. And its clear, crisp characters greatly minimize the chance of misreading.

Remote temperature monitor option.

Utilizing a precision thermistor, the remote temperature monitor converts the IL813 to a highly accurate digital readout thermometer. This allows standardization of all blood gas instruments and tonometers to the exact same temperature.

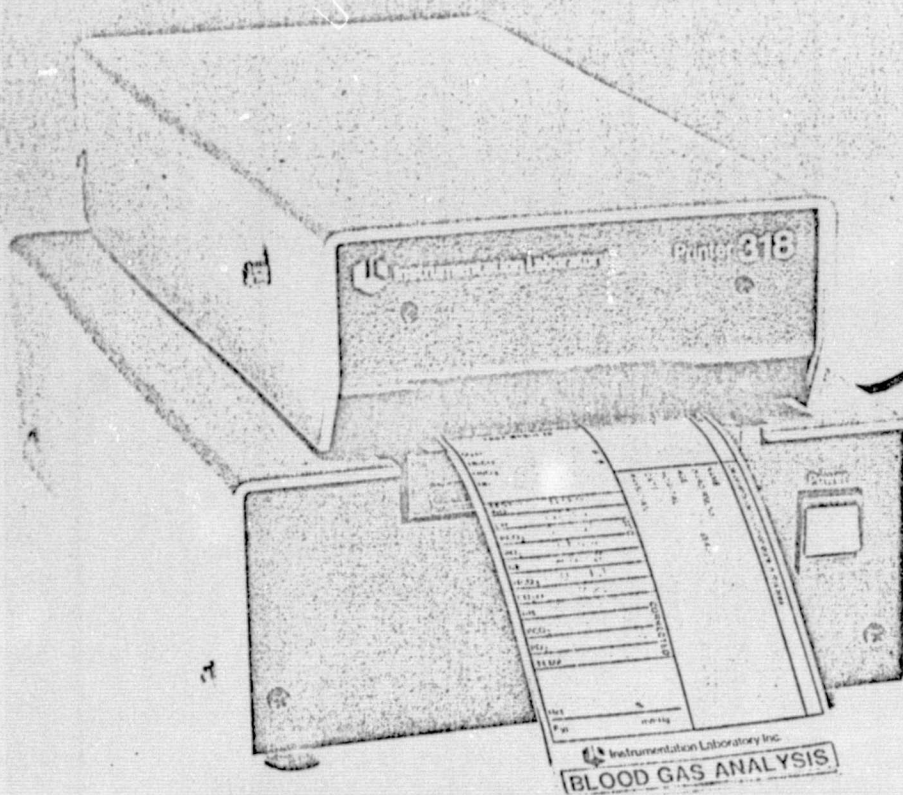
Laboratory demonstration.

The only way to fully appreciate the unique versatility and reliability of the IL813 — its engineering, its performance, its potential for increasing the effectiveness and efficiency of your staff — is through an actual demonstration right in your laboratory.

By contacting us at our Lexington, Massachusetts headquarters (see overleaf), you can arrange for this live demonstration of the IL813 at your convenience.

And remember, where the quality of health care is at stake, you can depend on the IL813.

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Specifications.

Electrical Requirements:
Volts 115, 230 or 100 VAC $\pm 20\%$
Frequency 60 or 50 Hz
(Please specify when ordering)
Ambient Operating Temperatures:
18 to 30°C or 64 to 86°F
Sample Size:
Nominal 500 μ l sample size
175 μ l microsample
Measuring Ranges:
pH 6.000 to 8.000
Pco₂ 010.0 to 200.0
Po₂ 000.0 to 2000
Calculating Range:
Base Excess -25 to +25 mEq/l
Actual Serum Bicarbonate
0 to 50 mEq/l
Total Serum CO₂ Content
0 to 50 mmol/l
Patient Temperature Correction
Range:
27 to 41.5°C

Safety Codes:
Conforms to L.A. and C.S.A.
regulations
Analysis Speed: 72 sec.
Direct analysis and derived
parameters
Leakage Current:
Less than 0.5 mA
Power Consumption:
200 Watts
Bench Weight:
92 pounds or 42 kilograms
Dimensions

	Inches	Centimeters
Height	13.8	35
Width	25.7	65
Depth	16.7	42

Readout:
Type: Light emitting diodes of 4 digits
each with floating decimal.

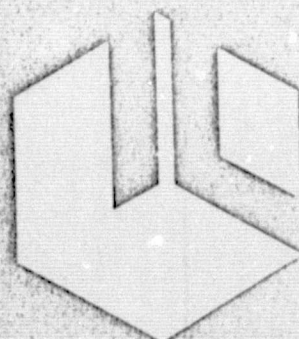
Mode: Analysis for pH, Pco₂ and
Po₂ and Calculate for BE, HCO₃ and
Total CO₂

Electronics:
Total solid state throughout. Printed
circuit boards easily accessible for
removal and operator replacement.

Calibration:
Automatic every 200 μ sec

Optional Equipment:
IL318 Blood Gas Ticket Printer.
Provides 3 duplicate tickets of each
analysis, including measured and
calculated values, in laboratory format,
with programmed sample identifica-
tion numbers from 001 to 999 having
reset capability.

IL Calibrating Gas Kit (Part 44536)
required for operation, complete
with 2 cylinders of analyzed gas,
regulators and "e" cylinder support.

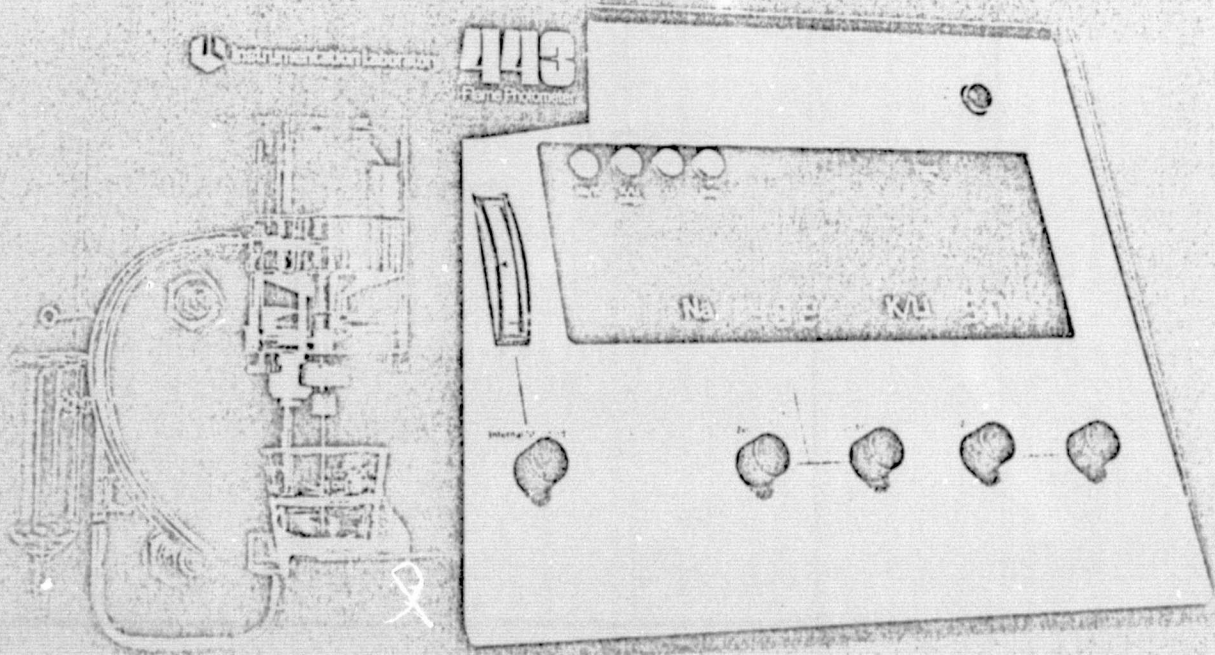


**Instrumentation
Laboratory Inc.**
Lexington, Mass. 02178
Tel 617 456 1075

Toll Free number
800 225 1451

The new
IL 4443
FLAME
PHOTOMETER

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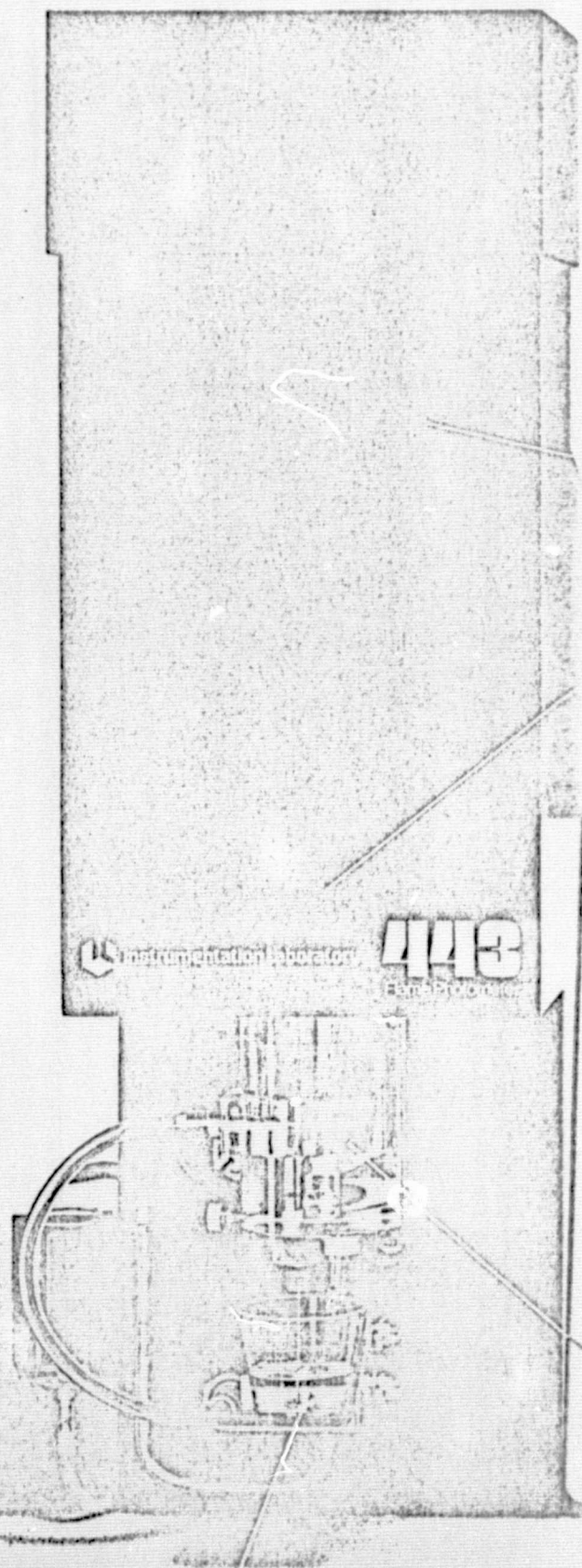
FLAME PHOTOMETER

- Large 4-digit LED readout.
- Built-in Li test capability and Computer/Printer output included as standard equipment.
- 1 μ l microsampling.
- State of the art electronics.
- Improved stability.
- Automatic curve correction on all channels.
- Simplified operation & low maintenance.
- Internal standard for improved accuracy.
- Optional automatic sample dilutor available.
- Simultaneous Na/K determinations in 7 seconds.
- Important: Specially designed to interface with new IL446 Cl/CO₂ Analyzer, forming a complete 4-channel Autolytes* System for Na, K, Cl, CO₂ determinations.



**Instrumentation
Laboratory Inc.**

*Trademark for IL's Automatic Electrolytes System



Microsampling—Only 1 μ l required for simultaneous Na & K geriatric or pediatric determinations.

Feature for feature, the best flame photometer value today.

Safety Stack—Emits only cooled exhaust into lab air, is cool to the touch.

Auto Gas/Air Ratioing—Achieved at the flame for improved stability and superior performance.

Pushbutton Operation—Front panel fingertip controls within easy reach for decimals, range, LI changeover and printer accessory.

Automatic Safety Warnings—Display panel identifies gas, air or flame fault condition, verifies LI mode.

Automatic Flame—Pushbutton On/Off switch automatically ignites flame, starts auto safety monitoring system and air compressor.

Simplified Maintenance—Accessible circuit-breakers and easy-to-replace circuit boards. Simple atomizer and burner assembly cleaning by aspirating distilled water through system. Optional diluter tubing conveniently located on front of instrument.

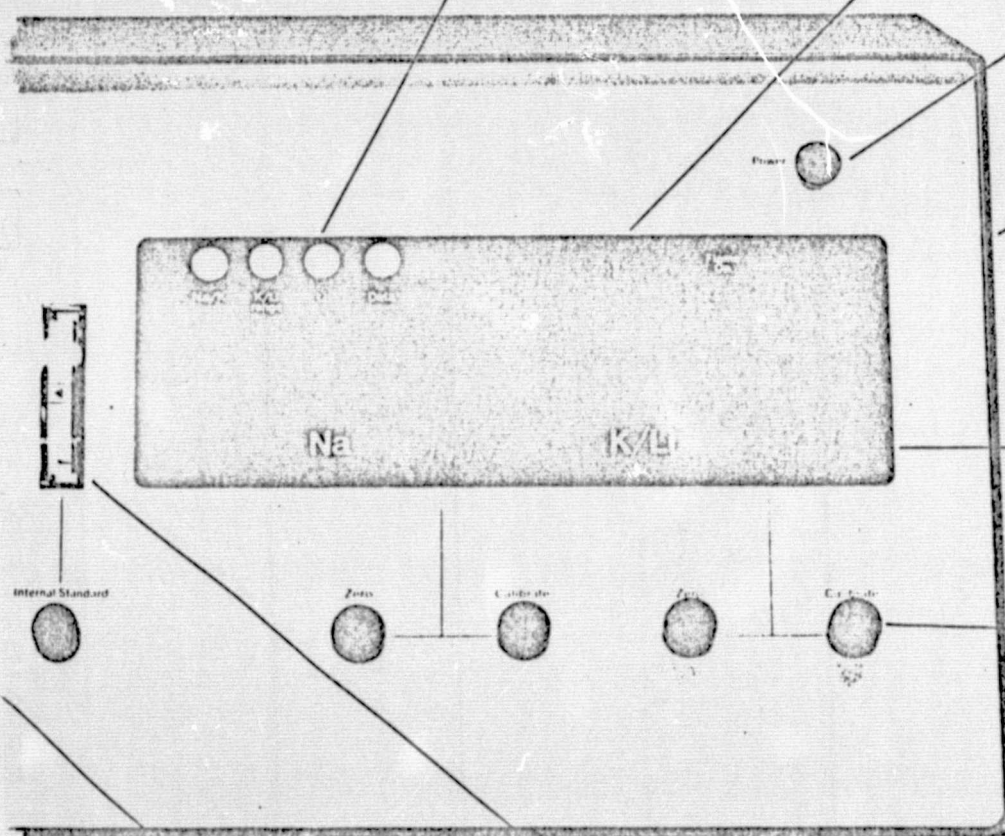
Easy-to Read Data—Large, longer-life 4-digit LED readout has moveable decimal and last-digit suppression at user's option.

Fast, Simple Calibration—Front panel Zero and Calibration controls for Na, K and Li. New linearizing circuits enhance operating accuracy and simplicity.

Automatic Linearization—Included on all channels for improved accuracy.

Completely Transparent—Aspirator System of clear plastic allows operator to visually monitor and adjust aspiration rate for optimum sensitivity.

Internal Standard Ratioing—For improved accuracy and greater stability with all determinations.

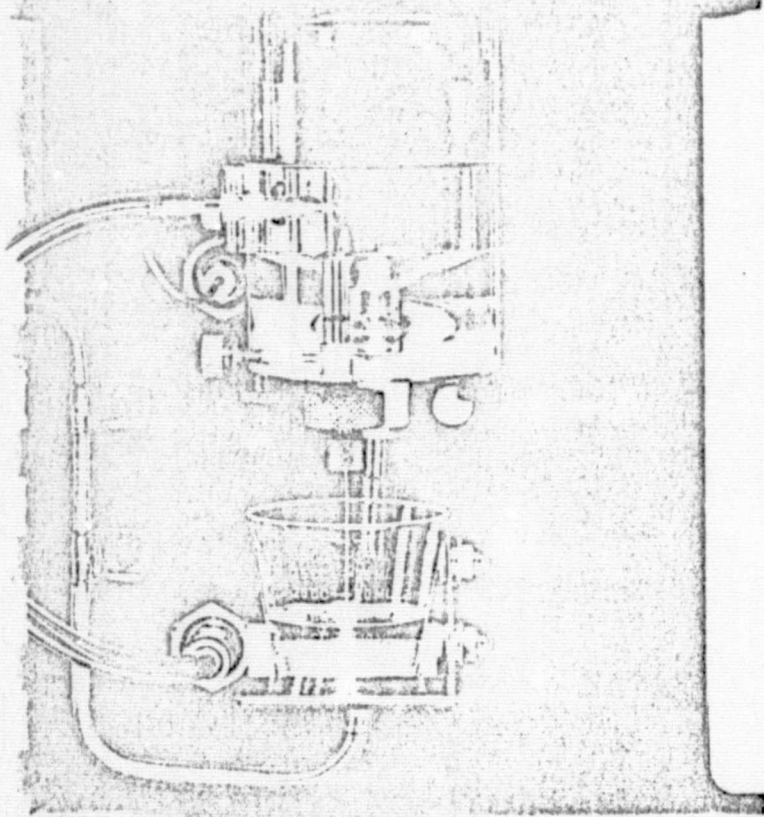




Instrumentation Laboratory

443

Flame Photometer



Aspirator System of clear, sturdy plastic allows operator to visually monitor and adjust aspiration rate for optimum sensitivity.

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SPECIFICATIONS

Dimensions

	Inches	Centimeters
Height	21 1/4	54
Width	20	51
Depth	17	43

Weight

48 pounds, 22 Kilograms

Operating Voltages

100, 120 or 240 Volts, $\pm 15\%$, 50 or 60 Hertz.

Air Requirements

Filtered, oil & water-free, from manifold or portable compressor, at 40 psig.

Volume Flow Rate: 0.5 scfm

Fuel

99 volume % washed propane, instrument grade.

Operating Pressure: 110 psig (typical).

Cylinder Capacity: Greater than 10 hours of operation.

Internal Standards

Lithium for Sodium & Potassium

(15 mEq/l)

Potassium for Lithium

(15 mEq/l)

Recommended Dilution Ratio

1:200 for Sodium & Potassium

1:50 for Lithium

Readout Range

Sodium: Zero to 199.9

Potassium: Zero to 199.9 or Zero to 19.99

Lithium: Zero to 19.99

Response Time

7 seconds, with manual dilutions.

Aspiration Rate

20 to 28 μ l/second.

Sample Volume

Minimum: 0.2 ml, diluted sample.
(1 μ l original sample).

Precision*

Na: 0.46% RSD

K: 0.61% RSD

Li: 3.2% RSD

(*Defined as the 90% Confidence Limit of 20 Replicate Serum Determinations.)

Display

4-digit LED, with moveable decimal and final digit suppression when needed. Automatic fault condition warnings for no air and no gas, plus "Flame On" and "Lithium" mode signals.

Simultaneous Na and K readouts.

Flame Input

Concentrations

Na: Zero to 1.0 mmol/l.

K: Zero to 1.0 mmol/l.

Li: Zero to 0.1 mmol/l

Options

IL Dilutor

Air Compressor

Automatic Printer/Sampler

Flame Standards in 1 ml disposable ampules.

OPTIONAL ACCESSORIES & SUPPLIES

IL444 Automatic Dilutor

Automatically mixes serum, plasma, urine or flame standard with distilled water and internal standard concentrate at 1:200 ratio in 17 seconds. Increases speed and precision, eliminates premixed blank solutions, calibrated glassware and special dilution procedures. Attaches easily to all IL flame photometers to provide better than 1% reproducibility.

Specifications—Dilutor

Input Concentration Na: Zero to 200 mmol/l.
K: Zero to 200 mmol/l.
Li: 3000 mmol/l.

Minimum Sample 0.11 ml original sample.

Response Time Less than 12 seconds.

Pump Tubing

Service Life 100 operating hours.

Air Compressors

New, quiet diaphragm-type IL24352-04 operates on 115 V, 60 Hz and delivers 0.47 scfm at 30 psig. IL24352-02 (piston-type) operates on 220 V, 50 Hz. IL24352-03 (piston-type) operates on 110 V, 50 Hz. All are compatible with the IL443 Photometer, according to specified voltage requirements. For lab air, the IL27457-02 Air Filter & Regulator Assembly is available.

IL Automatic Sampler/Printer

Dual, compatible units provide a dependable, automatic sample cycling program to speed determinations and print results. Sample Changer has

95-cup capacity; Digital Printer output tape in 11-column format for each test. Units can be used separately or together to minimize loading operations and manual recording of patient data. (Catalog No. IL20642.)

Specifications—Printer

Format 11 column digital printout,
Na & K in black, Li in red ink.

Dimensions Height: 7 inches,
Width: 8 1/2 inches,
Length: 14 inches,
Weight: 16 1/2 pounds.

IL446 Cl/CO₂ Electrolyte Analyzer

Designed for fully compatible interface with IL443 Flame Photometer to form a complete 4-channel Na/K/Cl/CO₂ Autolites System. (See IL446 brochure for complete description.)

IL Flame Standards

Available in 140/5, 160/8 and 120/2 mEq/l color-coded boxes of 50 (Na/K) 1 ml ampules. Convenient packaging eliminates waste, contamination and pouring from storage bottles. Disposable ampules snap open easily for direct introduction of standard to instrument. All 3 standards are viscosity-adjusted and also available in 500 ml bottles.

To arrange a demonstration of the IL443 Flame Photometer in your laboratory, contact your local Scientific Products Representative. Or call or write IL direct.



Instrumentation Laboratory Inc. Lexington, Mass. 02173 / Tel. 617-861-0710 / Telex 92-3440

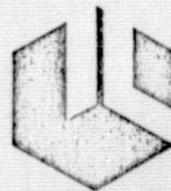
Customer Price List

Blood Gas Electrolytes Clinicard Electrophoresis

This official price list contains part numbers and prices for the instruments, expendable supplies and major replacement parts. Consult the appropriate IL Product Information Bulletin for complete descriptions of items.

For price information regarding Atomic Absorption, Sensorlabs and Cardiac Output Product lines consult appropriate price lists.

No. 5 Effective January 1, 1976. All prices subject to change without notice. All prices except gases FOB our plant, Net 30 days. Minimum order \$25.00



**Instrumentation
Laboratory Inc.**

Lexington, Mass 02173

Tel 617-861-0710

Telex 92-3440

Blood Gas, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
21218	11.60		Cuvette Gasket, 182
21219-01	30.60		Window Cuvette W/Samp Ports, 182
21219-02	21.40		Cuvette Window, 182
21233	124.00		Beam Splitter Assembly, 182
21244	3.50		Thumb Screw
21254	4.20		Cuvette Cushion, 182
21256	8.10		Helix Clip, 182
21257	3.10		Thumb Screw for 182 Lamp Block
21261	30.60		Gear 2 1/2 Inch Diameter, 182
21293	86.70		Terminal Block and Choke Assembly
21298	161.70		Module No. 1 Assembly - 113
21299	161.70		Module No. 2 Assembly - 113
21579-01	2.10		Tubing, Autosampler Valve/Vent per foot
21579-02	2.10		Tubing, Autosampler Valve/Exit per foot
21579-04	2.40		Tubing, Autosampler Valve/Cuvette per foot
21579-05	2.40		Tubing, Autosampler Pump/Bottle per foot
21579-06	2.40		Tubing, Autosampler Vac/Bottle per foot
21579-07	3.50		Tubing, Autosampler pH/Bottle per foot
21579-08	2.40		Tubing, Autosampler Bubble Chamber/Humidifier per foot
21610-01	1.20		Humidifier Output Tubing
21610-02	1.20		Humidifier Input Tubing
21611-01	2.40		Humid. Output Tubing Support
21611-02	2.40		Humid. Input Tubing Support
21659	144.40		Motor Assembly, 182
21758	80.90		Po ₂ Cuvette, 113, 213
21759	104.00		Pco ₂ Cuvette, 113, 213
21760	28.90		Left End Plate 113, 213 Tank
21761	34.70		Plate Right End 113, 213 Tank
21830	7.00	B6634-51	End Block Fitting, 313
21959-02	12.70		Manual Pump Assembly Tubing, 313
21960	26.10		Drip Tray
21961	31.88		Lamp Source Assembly, 182
22012	63.60	B6673-3	pH Reference Electrode
22115	3.20		Thumb Screw 6 - 32 x 13/32
22191	37.39		Thermistor Assembly, 127, 237, 329
22233	3.50		Plug Modification, Thermometer
22274	11.60		Po ₂ Plug
22277	11.60		Pco ₂ Plug
22283-01	3.20	B6634-72	Cuvette Washer .197 x .391
22283-02	3.20	B6634-73	Cuvette Washer .197 x .562
22292	1.20		Adaptor Nut, Autosampler
22296	7.00		End Plate Gasket, 113-02
22297	57.30		Salt Tray
22299	23.10		Saline Coil for 113-02
22311	4.70	B6634-75	Retaining Ring Pco ₂
22348	104.00	B6642-1	Scale Expander Assembly, 113
22360	14.50		Autosampler Plate Assembly
22361	26.10		Small Drip Tray
22372	4.70		Sleeve Seal
22554	12.70		Waste bottle Assy., 16 oz.
22581	28.90		Helix Post and Tubing Assembly - 182
22583	11.60		Frame/Cuvette Tubing Assembly
22584	5.80		Pump/Waste Tubing Assembly, 182
22585	7.00		Tubing Boss Hemolyzer Assembly, 182
22586	5.80		Hemolyzer/Frame Tubing Assembly, 182
22587	10.40		Cuvette/Pump Tubing Assembly, 182
22589	11.60		Tubing-Pump/Boss, 182
22590	8.10		Tubing-Bottle/Pump, 182
22649	26.80		Sample Cup Bracket
22695	83.57		Ultra Micro pH 127 Salt Bridge
22829	84.00		Diff. Amplifier Assembly
22930	144.40	B6673-4	Electrode Ultra Micro Glass Capillary
23477	42.00		Assy Salt Bridge and Bolt
23694	48.39		Coaxial Cable Assembly
23709	75.00		313 Calibration, A/V
23710	75.00		313 Membrane Changing, A/V
23711	75.00		313 Sampling, A/V
23712	75.00		313 Basic Maintenance, A/V
23713	75.00		217 Operation, A/V
23715	75.00		213 Calibration, A/V
23716	75.00		213 Sampling, A/V
23717	75.00		213 Membrane Changing, A/V
23718	75.00		213 Maintenance, A/V
23719	75.00		182 Calibration, A/V
23720	75.00		182 Maintenance, A/V

Order items from S/P. Use IL part numbers for items that have no S/P part numbers.

Blood Gas, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
23767	75.00		Blood Gas Quality Control, A/V
24004	89.30		Servo Drive Amp Module Assembly
24067	144.40		Cuvette 182 Assembly
24080	75.10		Transformer Power Specific, 182
24095-01	98.20		Module No. 4, Input FTR 81582
24217	70.70	B6661-5	Humidifier — 127 Assembly
24228	80.90		Solenoid Assembly for Hemolyzer — 182
24255	86.70		Phototube Assembly, 182
24259	259.90		Lamp Block Assembly, 182
24282	156.00		Ultra Micro pH Head Assembly
24301	168.27		Ultra Micro Tank Sample Holder Assembly
24312	17.50	B6650-2	2 Way Luer Stopcock Valve
24313	23.10	B6650-1	3 Way Luer Stopcock Valve
24390	34.70		Check Plug Assembly
24512	49.40		Heater Assembly, 127/329
24570	275.00		Harmonic Modulator Assembly
24600	56.70		Roller Pump Assembly
24631-01	55.80	B6642-5	Cable, Rec T/R 1ma
24631-02	47.40	B6642-6	Cable, Rec T/R 0.5 Ma
24631-03	56.50	B6642-7	Cable, Rec T/R 10 Mv
24631-04	56.50	B6642-8	Cable, Rec T/R 100 Mv
24766	115.50		Flex Arm Ultra Micro pH 127
24774	133.50		Electrode Check Box Assembly
24993	52.00	B6675-5	Electrode Stand pH/Pco ₂
25079	36.80		Lecture BTL 1 SCF CO
25080	42.00		Lecture BTL 95% O ₂ , Bal CO ₂
25142	11.60		IL P ₅₀ Worksheet Tablet, 50/pad
25146	11.60		IL O ₂ Dissociation Worksheet
25151	9.30		IL Po ₂ /pH Nomogram 1 pad
25326	115.50		Selector Valve Assembly
25331	462.00	B6642-25	Auto Sampler Kit
25684	30.10	B6634-13	Tubing Adaptor Hi - Buffer
25685	288.80	B6634-43	Valve Assembly
25697	202.20		Sampler Assembly
25700	176.70		Bubble Chamber Assembly
25701	495.30		Valve Drive Assembly
25808	21.00	B6634-2	Blood Gas Analysis Tickets
25832	120.80		713 Bubble Chamber Assembly
25833	462.00	B6631-15	713 Valve Drive Assembly
25842	144.40	B6631-11	Selector Valve Assembly
25852	5.80	B6631-13	713 Selector Knob
25874	183.80	B6631-16	713 Sampler Assembly
25907	31.50		Calculator Millivolt Source, 214
27039	412.50		Servo Assembly, 182
27188	635.30		Ultra Micro Pco ₂ /Po ₂ Assembly, 113, 213 Tank
27363	698.80		Complete Tank Assembly, 113-02
27642	94.50	B6671-1	Yoke Regulator Needle Valve
27837	140.77		Cuvette, 313
28251	837.40		Tank Assembly, 513
28493	446.30		713 Stepper and Heater Card Assembly
28494	56.70		713 Encoder Card Assembly
28498	88.20		713 DVM Card Assembly
28501	425.00		713 Control Card Assembly
30100	18.50		Pump Diluent Tube 182, 2/pkg.
30101	18.50		Pump Waste Tube 182, 2/pkg.
30102	7.00		Cuvette Seals 182, 2/pkg.
30103	7.00		Cuvette Screw 182, 4/pkg.
30113	8.40		PVC Tubing, 1/16 x 7/32 — 10 feet
30114	21.99		Polyurethane Tubing, 3/16 x 1/8
30115	31.50	B6673-11	pH and Fast Pump Windings 6/pkg.
30118	7.00		Tubing Kit, Neoprene 1-8 Ft. Length
31060	7.60		Buffer — 6.84 pH, 500 ml btl.
31060-10	68.10	H5685-3A	Buffer — 6.84 pH, ten 500 ml btl.
31070	9.80		Buffer — 7.384 pH
31070-12	107.50	H5685-1	Buffer — 7.384 pH, 12 btl.
33010	9.00		Electrolyte — Po ₂ , 500 ml btl.
33010-10	82.50	B6660-3	Electrolyte Po ₂ , ten 500 ml btl.
33011	13.70		Electrolyte — Po ₂ Jell 2 oz.
33012	8.80		Electrolyte — Gell, 2 oz Jar
33020	9.00		Electrolyte — Pco ₂ , 500 ml btl.
33020-10	82.50	B6660-4	Electrolyte Pco ₂ , ten 500 ml btl.
33104-06	9.90	S1807-5	Cleaning Agent — 4 oz. btl.
33106-12	18.50	B4533-1	CO-Oximeter Diluent — 12 btl.
33107-10	34.70		Zeroing Solution — 182 ten 500 ml btl.

Order items from S/P. Use IL part numbers for items that have no S/P part numbers.

Blood Gas, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
33109-12	20.80	B6673-20	Flushing Solution - 313, 12/pkg.
34001	13.90		Anti-Foam 4 oz bottles
34001-12	152.50	B6664-1	Anti-Foam, 4 oz 12/bx
34010	11.10		pH Electrode Cleaner - 500 ml btl
34010-10	108.60	H5685-2A	pH Electrode Cleaner - ten 500 ml btl
34020	2.70		Saturated KCl - 4 oz. (with Agcl)
34020-12	28.70	H5685-8	Saturated KCL - 4 oz 12 btl/case
34030	8.10		Bath Kleer - 4 oz.
34030-12	89.00	H5687	Bath Kleer - 4 oz 12 btl
34040	9.50		Plexi-Glue - 1/4 oz.
34070	2.70	B6634-53	Saturated KCl (without Agcl)
34070-12	28.70		Saturated KCl 0 12/ctn. (without Agcl)
35020	7.00		Silicon Stopcock Grease - 2 oz.
39100	11.60	B6661-3	Capillary Tube - 100 μ l
39101	4.70		Magnet
39997	34.70		Acid Base Slide Rule
39999	11.60	B6667	pH Blood Gas Calculator
41111	6.30	B6634-20	Sample Inlet, pH
41220-02	68.30		Kit Wet End Replacement, 313 - 513 - 713
41259	3.20	B6634-57	Seal Nozzle
41277-02	86.70	B6634-34	Sample Pre-Heater Assembly
41288-01	5.30	B6634-25	513 - KCl Inlet Membrane Assembly
41304	4.70	B6634-48	Bottle Cap
41318	4.70	B6634-49	Cap Retainer Hi-Buffer
41355	3.20	B6634-22	CO ₂ Cartridge
41358	40.50	B6634-23	Tubing Adaptor, Low Buffer
41359	23.10	B6634-24	Tubing Adaptor, Flush
41360	57.80	B6634-60	Tubing Adaptor, Waste
41370	98.20	B6634-35	Thumb Wheel Assy.
41395	57.80	B6634-41	Flush Reservoir
41418	3.20	B6634-58	pH Tip Seal
41421	3.50	B6634-59	Flush Cup Sampler Orifice
41476	63.60		Salt Bridge Extension
41513	259.90	B6634-42	KCl Reservoir
41545-01	1.20	B6634-76	Neoprene Washer
41545-02	1.20	B6660-4	Neoprene Washer
41580	3.50	B6634-77	Plug Cap, Modified
41794-03	13.90	B6634-56	Peristaltic Pump Tubing
41852	19.70	B6634-44	Chamber Cap
41936	1.20	B6634-74	Retaining Ring, Po ₂
44009	168.00	B6634-61	Accessories Kit, 513
44072	75.00	E8000-19	513 Calibration, A/V
44073	75.00	E8000-20	513 Sampling, A/V
44074	75.00	E8000-21	513 Membrane Changing, A/V
44075	75.00	E8000-22	513 Maintenance and Service, A/V
44083	710.40	B6634-55	Electrode Bank and pH/Pco ₂ /Po ₂ Electrodes 513/713
44095	412.50	B6638-10	Calibrating Gas Kit, 113/213
44096	577.00	B6634-1	Calibrating Gas Kit 313
44107	236.30		Electrode Check Box W/Cables
44144	6.30	B6634-21	Sampling Kit .043 Dia
44145	3.20	B6634-62	Sampling Kit. .030 Dia
44146	5.80	B6634-63	.030 Dia Sampling Tip Kit
44147	1097.30	B6634-64	Customer Replacement Parts Kit, 513
44196	1097.30	B6631-10	Customer Replacement Parts Kit, 713
44373	78.80		713 Service Manual
44536	577.00	B6634-3	Calibrating Gas Kit 513/713
50100	35.00		Cylinder Gas, E size Post
50200	75.00		Cylinder Gas, H size CGA 540 VAL
50400	75.00		Cylinder Gas, M size CGA 540 VAL
50564	1.80		Allen Wrench 5/64
50764	1.80		Allen Wrench 7/64
51100	26.30	B6670-20	Base Support E or D Cylinder
51200	52.50		Base Support for H Cylinder
52002-31	7.00		Dust Cover 231, 182
52100	43.10		Gas Mix, 100% Nitrogen - 20 scf
52210	60.40	B6670-1	Gas Mix, 5% CO ₂ , Bal O ₂ - 20 scf
52211	60.40		Gas Mix, 5% CO ₂ , Bal N ₂ - 20 scf
52213	60.40		Gas Mix, 4% CO ₂ , Bal O ₂ - 20 scf
52214	60.40		Gas Mix, 8% CO ₂ , Bal O ₂ - 20 scf
52220	42.00	B6670-4	Gas Mix, 10% CO ₂ , Bal N ₂ - 20 scf
52224	60.40		Gas Mix, 3% CO ₂ , Bal N ₂ - 20 scf
52231	68.30		Gas Mix, Specify % CO ₂ , Bal O ₂ - 20 scf
52232	68.30		Gas Mix, Specify % CO ₂ , Bal N ₂ - 20 scf
52233	68.30		Gas Mix, Specify % CO ₂ , Bal Air - 20 scf
52234	68.30		Gas Mix, Specify % CO ₂ , Bal N ₂ - 20 scf

Order items from S/P. Use IL part numbers for items that have no S/P part numbers.

Blood Gas, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
52310	54.60	B6670-6	Gas Mix, 5% CO ₂ , 12% O ₂ - 20 scf
52311	79.30		Gas Mix, 10% CO ₂ , 12% O ₂ - 20 scf
52312	79.30		Gas Mix, 12% CO ₂ , 21% O ₂ , Bal N ₂ - 20 scf
52317	54.60		Gas Mix, 7% CO ₂ , 7% O ₂ , Bal N ₂ - 20 scf
52320	87.20		Gas Mix, Specify CO ₂ , Specify O ₂ , Bal N ₂ - 20 scf
52321	54.60		Gas Mix, 5% CO ₂ , 20% O ₂ , Bal N ₂ - 20 scf
55100	94.50		Gas Mix, 100% Nitrogen - 180 scf
55100-01	53.60		Gas Mix, 100% Nitrogen - 90 scf
55210	171.80		Gas Mix, 5% CO ₂ , Bal O ₂ - 180 scf
55210-01	114.50		Gas Mix, 5% CO ₂ , Bal O ₂ - 90 scf
55211	171.70		Gas Mix, 5% CO ₂ , Bal N ₂ - 180 scf
55211-01	114.50		Gas Mix, 5% CO ₂ , Bal N ₂ - 90 scf
55220	120.80		Gas Mix, 10% CO ₂ , Bal N ₂ - 180 scf
55220-01	80.90		Gas Mix, 10% CO ₂ , Bal N ₂ - 90 scf
55231	184.30		Gas Mix, Specify % CO ₂ , Bal O ₂ - 180 scf
55232	184.30		Gas Mix, Specify % CO ₂ , Bal N ₂ - 180 scf
55233	184.30		Gas Mix, Specify % CO ₂ , Bal Air - 180 scf
55234	184.30		Gas Mix, Specify % O ₂ , Bal N ₂ - 180 scf
55235	127.10		Gas Mix, Specify % CO ₂ , Bal O ₂ - 90 scf
55236	127.10		Gas Mix, Specify % CO ₂ , Bal N ₂ - 90 scf
55237	89.30		Gas Mix, Specify % CO ₂ , Bal Air - 90 scf
55238	127.10		Gas Mix, Specify % O ₂ , Bal N ₂ - 90 scf
55310	134.40		Gas Mix, 5% CO ₂ , 12% O ₂ , Bal N ₂ - 180 scf
55310-01	94.50	B6670-10	Gas Mix, 5% CO ₂ , 12% O ₂ , Bal N ₂ - 90 scf
55311	192.20		Gas Mix, 10% CO ₂ , 12% O ₂ , Bal N ₂ - 180 scf
55311-01	135.00		Gas Mix, 10% CO ₂ , 12% O ₂ , Bal N ₂ - 90 scf
55317-01	94.50		Gas Mix, 7% CO ₂ , 7% O ₂ , Bal N ₂ - 90scf
55320	204.80		Gas Mix, Specify % CO ₂ , Specify % O ₂ , Bal N ₂ - 180 scf
55321	115.50		Gas Mix, 5% CO ₂ , 20% O ₂ , Bal N ₂ - 180 scf
55321-01	94.50		Gas Mix, 5% CO ₂ , 20% O ₂ , Bal N ₂ - 90 scf
55323	147.60		Gas Mix, Specify % CO ₂ , Specify % O ₂ , Bal N ₂ - 90 scf
55324	144.90		Gas Mix, 3% O ₂ , 5.6% CO ₂ , Bal N ₂ - 90 scf
55325	144.90		Gas Mix, 4.5% O ₂ , 5.6% CO ₂ , Bal N ₂ - 90 scf
55326	186.90		Gas Mix, 3% O ₂ , 5.6% CO ₂ , Bal N ₂ - 180 scf
55327	186.90		Gas Mix, 4.5% O ₂ , 5.6% CO ₂ , Bal N ₂ - 180 scf
55328	117.60	B6670-12	Gas Mix, 20% O ₂ , 5.6% CO ₂ , Bal N ₂ - 90 scf
55329	104.00	B6670-11	Gas Mix, 5.6% CO ₂ , Bal N ₂ - 90 scf
55330-01	144.90		Gas Mix, 5.6% ± .05% CO ₂ , Specify O ₂ , Bal N ₂ - 90 scf
56052	2.40		Y Branch Fitting
56280-12	27.30	B6661-6	Outer Pco ₂ Membrane Kit
56294-05	9.00	B6650-5	Fuse, 2 amps slow blow 5/bx
56300-05	9.00	B6644-6	Fuse, 3/8 amp slow blow 5/bx
56590	33.10		Relay - 182
56595	2.10		Filling Tube, Blunt 26 Ga x 1½ Lgh
57137	2.60	S1807-35	Connector - Male Luer
57401-03	13.90	B6631-12	713 Belt for Selector Valve
57437-05	8.10		Fuse, 1/2 amp, Fast Acting 5/bx
57464	152.30	B6673-30	Two Stage Regulator for E Cylinder
57465	152.30	B6673-31	Two Stage Regulator for H and M Cylinder
57533	1.80		Luer Stub Adapter 18 Ga
57573	.70	B6634-40	Plug Cap
57649	57.30		Valve Check Assembly
58199	12.60	B6634-47	Thermometer 0 - 40°C
58595	19.20		Stopcock Oneway Double Female
58605	8.60		Check Valve
58941	48.60		Adapter Thread to Yoke Regulator
60000	315.00	E8000-1	Projector, Cartridge Cassette
64084	5.20		Wire Fleas, 1/4 Lg x .025 Dia SST
64210-08	1.50	B6634-71	Thread Seal Washer
64422	2.40	B6634-26	PVC Tubing 1/8 OD x 1/16 ID
64425	1.10		PVC Tubing 5/32 x 1/8
64432	1.10		PVC Tubing 1/4 x 3/16
64446	1.30		Latex Tubing 3/16 x 1/8
64456	1.10		Nylon Tubing .082 x .052
65506	380.00		Power Supply Board Assembly, 213
65531-02	157.50		Bath Assembly Motor, 237
65538	186.80		Pump Assembly, 237
66771-02	4.70		Pulley Belt, 237
67040	11.60		Micro Switch
68781	9.60		Teflon Filter
69372	17.40		Glass Cuvette 3/pkg, 237
69373	7.70		Plastic Filling Tube 12/pkg.

Order items from S/P. Use IL part numbers for items that have no S/P part numbers.

Blood Gas, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
69571	5.20		Bulb Switch, 237
72368-35	3.20		Tubing Labels - 313, 1-18
72368-36	3.20		Tubing Labels - 313, 19-36
72531	2.40		513/713 Push Button Lamps
72541	3.50		IL Quality Control Chart
72637	13.90	B6631-14	713 Aspiration Switch
72751	4.70		Silc Tubing Translucent
73300	12.60	B6642-11	IL Acid-Base Nomogram
78028	75.00	E8000-25	713 Calibration, A/V
78029	75.00	E8000-26	713 Sampling, A/V
78030	75.00	E8000-27	713 Membrane Changing, A/V
78031	75.00	E8000-28	713 Maintenance and Service, A/V
79110	12.70		Instruction Manual - IL213
79131	12.70		Instruction Manual - Ultra Micro System 113-01
79132	12.70		Instruction Manual - Micro System 113-02
79182	12.70		Instruction Manual - 182
79215	10.50		Instruction Manual - 214
79313	12.70		Instruction Manual - 313
79513	12.70		Instruction Manual - 513
79713	12.70		713 Operators Instruction Manual
81010	17.40	B6644-3	Mercury Battery, 1.35 V - 113
81020	10.40	B6644-4	Mercury Battery, 1.35V - 125
81430	57.80		Electrometer Tube
86017	20.40		Flexible Vinyl Curve
89055	15.80		Test Resistor Kit
91035	9.80		Adapter, Male Luer
91060	3.50		Glass Beaker
92010	11.90	B6664-2	Thermometer 10 - 40°C
92059	3.20		White Drain Plug, Threaded
92089	23.00		O-Ring Kit for the 27188 Tank
92272-01	121.00		Water Pump 127, 120 V 60 Hz
92282	26.50		Water Pump Repair Kit
92509	1.80		Ultra Micro Pco ₂ /Po ₂ Sample Tubing
92511	3.50	B6664-4	O-Ring Capillary Tube 12/pkg.
93006	95.40		Cuvette Assembly Micro Po ₂
93201	120.20		Pco ₂ Micro Cuvette Assembly
96101	15.00		Nipple, 237
96290	104.00		Flowmeter - 237
96334-02	228.70		Timer - 237, 0-30 min. 60 Hz
96680	76.30		Heater Assembly, 237
98203	15.00		Heater Support, 237
98304-20	7.90	H5683-1	Buffer 6.840, pH 20 ampules
98305-20	7.90	H5683-2	Buffer 7.384, pH 20 ampules
98698	20.40		Thermometer - 237
98867	63.00		Transformer, 237
99313	75.00		Upper Lid Assy., 237

ELECTROLYTES - 143, 243, 343, 443, 144, 279

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
143	2995.00	S1800-1	Flame Photometer - 120 V
143-01	4000.00	S1800-5	Flame Photometer Cement - 120 V
143-02	3465.00	S1800-2	Flame Photometer, Na, K, Li, 115 V
143-03	4000.00		Flame Photometer, Low Sodium
143-12	4084.50		Flame Photometer, Li/REC 120 V
143-13	4042.50		Flame Photometer, Low Sodium 120 V W/REC
143-30	3465.00		Flame Photometer, Cmptr 120 V
143-31	4084.50		Flame Photometer, CEM - Cmptr 120 V
143-32	3990.00		Flame Photometer, Na/K/Li, Cmptr 120 V
144	514.50	S1807-1	Dilutor, 60 Hz
243	3300.00	S1790-1	Flame Photometer, 243 120/60
279	1350.00	B5948-1	Chloride Analyzer 120/60
343	3937.50	S1770-4	Flame Photometer 120 V
343-01	4399.50	S1770-2	Flame Photometer 120 V W/Dilutor
343-02	4200.00	S1770-3	Flame Photometer, Li 120 V
343-03	4662.00	S1770-1	Flame Photometer, Li W/Dilutor
343-30	4095.00		Flame Photometer, 120 V W/Computer
343-31	4557.00	S1770-28	Flame Photometer, W/Computer and Dilutor
343-32	4357.50	S1770-38	Flame Photometer, Li W/Computer
343-33	4819.50	S1770-18	Flame Photometer, Li W/Computer and Dilutor
443	3850.00	S1772-1	Flame Photometer, Li W/Computer
20331	8.50	S1807-12	Water pump Tubing - Dilutor
20332	9.50	S1807-10	Sample Tubing - Dilutor 2/pkg.
20341	10.50	B4531-51	Tubes Pump Sample Kit 231, 2/pkg.
20433	514.50		Dilutor Conversion Kit, 343
20434	304.50		Lithium Conversion Kit, 343
20435	262.50	S1821-6	Computer Conversion Kit, 343
20468	9.70	B5948-7	Diluent Tubing - 279 2/pkg.
20641-02	1417.50	S1820-2	Sample Changer Package 120 V
20642-02	2730.00	S1820-1	Printer/Changer 120 V
20643-02	1575.00	S1820-3	Printer Package 120 V
21004	159.40		Pump Cage Assembly
21005	91.90		Pump Bearing Support Assembly
21011	22.60		Fitting Tee
21012	7.40	B4531-7	Aspirator Tube for Automatic Sampler and Dilutor
21014	7.40	B4531-10	Hemolyzer Tube Assembly, 231
21015	12.70		Arm Micro Switch
21018	63.00		Rectifier Board Assembly
21388	73.50		Phototube Assembly
21429	121.40		Roller Pump Assembly
21448	2.70	S1807-32	Tube-Flashing Cage 3/8 Lg
21485	15.80	S1807-20	Glass Drain Receptacle
21486-01	7.90		Feed Line - Blt/Pump Assembly
21486-02	10.00		Feed Line - Smpl/Pump Assembly
21516-01	2.90		Tubing - Silc Micro Switch Support
21516-02	10.00		Tubing - Silc Pump Sample/Tee
21517-01	4.50		Tubing - Silicone No. 3
21517-02	4.50		Tubing - Silicone No. 3
21518	3.50		Tubing - Intake and Exit
21519	10.00		Tube Aspirator to Pump Assembly
21524	15.80	S1807-26	In-Line Water Filter, 144
21573	7.40		Tube-Hemolyzer to Tee
21747	63.00		Output Cable and Connector Assembly, 143-10
22102	36.80	S1805-3	Chimney Glass
22646-01	25.80		Sample Cup Assembly
22679-01	28.40		Trap and Drain Assembly
22754	49.40		Flame Indicator Assembly
22776	63.00		Sample Cup Assembly, 144
22876-01	48.30		Phototube Assembly 9338
22876-02	41.00		Phototube Assembly 433 E
23025	48.30		Solenoid Assembly
23263	17.90		Lamp Holder Bracket
23264	91.40		Lower Tubing Holder Assembly
23269	39.90		Handle Lower Tube Assembly
23285	9.00		Pulley Motor
23287	173.30		Filter Holder and Procedure Assembly
23291	6.60		Mixing Tube
23292	10.30		Mixing Chamber, 279
23311	1.50		Tube-Diluent Pump Insert
23342	70.40		Tubing Clamp Assembly
23344	3.70		Tubing .018 x .50 Long
23345-01	11.10		Tubing .025 ID x 4 In. Long

Order items from S/P. Use IL part numbers for items that have no S/P part numbers.

Electrolytes, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
23345-02	14.50		Tubing .025 ID x 5.50 Long
23345-03	14.70		Tubing .025 ID x 3.37 Long
23345-04	14.70		Tubing .025 ID x 3.75 Long
23346-01	4.20		Tubing .050 ID x 1.75 Long
23346-03	3.60		Tubing .050 ID x 1 Long
23346-04	18.90		Tubing .050 ID x 1125
23346-05	4.20		Tubing .050 ID x 1.25 Long
23714	75.00	E8000-11	143 Maintenance, A/V
23725	75.00	E8000-12	343 Maintenance, A/V
24176	62.00		Mixing Chamber Assembly - 144
24184-01	98.54		Chimney Mounting Ring - RH Assembly - 143
24352-04	220.00	S1803-4	Air Compressor Assembly - 143 115 V/60 Hz
24469	50.00		Propane Gas Hose and Valve Assembly -143
24470	70.37		Fuel Line and Holder Assembly RH 143
24573	50.00		Propane Gas Hose and Valve Assembly, 343
24602-01	34.20	S1805-7	Assembly Holder Sample
25069	173.30		Cuvette Holder Assembly
27003	39.40		Ignition Electrode Assembly
27193	415.80		Servo Assembly; 143
27407	519.80		Plumbing Assembly, 343
27417	472.50		Dilutor Assembly
27457-02	127.10		Air Filter Regulator Assembly
27490	14.70		Dust Cover, 143
27698	199.50		Tubing Assembly
27713	378.00		Servo Assembly, 279
28176	514.50		Servo Assembly, 243
30108	74.77		Na Phototube and Mask Kit - 143
30109	74.77		Li Phototube and Mask Kit - 143
30110	74.77		K Phototube and Mask Kit - 143
30116	4.80		Tubing Kit - 3/16 OD x 3/32 ID, Latex - 5 feet
30121	127.40		Interference Filter Kit, 143, 343 - Na
30122	127.40		Interference Filter Kit, 143, 343 - Li
30123	127.40		Interference Filter Kit 143, 343 - K
33100-24	27.80	B4531-1	Standard Calibrating Dye 24/pkg - 231
33102-10	35.80	B4531-2A	Diluent 231 - Ten 500 ml Bottles
33103	6.90	B4531-3	Two Liter Bottle for Diluent
33104-06	9.90	S1807-5	Cleaning Agent - 4 oz bottles
33110-06	10.20	S1803-9	Rinse Solution - Six 4 oz bottles
33111-10	25.80	B5948-5A	Chloride Reagent - Diluent - Ten 500 ml bottles
33112-06	17.40	B5948-6	Chloride Standard 100 mEq/L 6 bottles
33117	37.80	B5948-4	Chloride Diluent Reagent - Cubitainer
33201	21.00	S1803-25A	Cement Standard Na ₂ O/OK ₂ O/CAO
33202	21.00	S1803-27A	Cement Standard - 100 Na ₂ O/100K ₂ O
33203	10.60	S1803-35A	150 MEQ K/L Standard - 500 ml
33204	10.60	S1803-37A	1 MEQ Li/L Standard - 500 ml
35000	10.50	S1803-10	1500 MEQ Li/L Standard - 500 ml
35000-10	91.10	S1803-11	1500 MEQ Li/L Standard ten 500 ml bottles
35003-06	27.80	S1807-8	Lithium Nitrate 3 Ea/L 6 bottles/pkg.
35050	10.00		50 Na/50 K Standard 500 ml bottle
35050-10	91.10	S1803-14A	50 Na/50 K Standard ten 500 ml bottles
35100	10.00		100 Na/100 K Standard 500 ml bottle
35100-10	91.10	S1803-21	100 Na/100 K Standard ten 500 ml bottles
35120	10.00		120 Na/2 K Standard 500 ml bottle
35120-10	91.10	S1803-15A	120 Na/2 K Standard 10 bottles/pkg.
35140	10.00		140 Na/5 K Standard 500 ml bottle
35140-10	91.10	S1803-12A	Standard 140 Na/5 K - ten 500 ml bottles
35160	10.00		160 Na/8 K Standard 500 ml bottle
35160-10	91.10	S1803-17A	160 Na/8 K Standard ten bottles/pkg.
37001-06	10.00	S1807-28	Replacement Filter - Element Kit
39039-09	14.50		Sample Cups, 1 oz - 900/pkg.
41991	75.00		243 Maintenance, A/V
56294-05	9.00	B6650-5	Fuse - 2 Amp Slow Blow 5/bx
56295-05	9.00		Fuse - 5 Amp Slow Blow 5/bx
56298-05	9.00		Fuse - 1 Amp Slow Blow 5/bx
56300-05	9.00	B6644-6	Fuse 3/8 Amp Slow Blow 5/bx
56424	12.80		On-Off Switch W/Blk Button
56515	8.10		Micro-Switch 5 Amp
56530	149.00		Motor Induction 115 V/60 Hz
56590	33.10		Relay - 231
56920	40.70		Circuit Breaker, 5 Amp
57000-12	56.70	S1803-1	Propane Fuel, Instrument Grade 12 Cyl/bx
57651	11.60	S1821-10	Sample Cup Holder

Electrolytes, continued

IL PART NO.	PRICE	S/P NO.	DESCRIPTION
58359-05	9.00		Fuse 6 1/4 Amp Slo-Blo 5/bx
58519	5.80	S1821-14	Printer Ribbon
58563	6.30		Bulb Lamp
58734	31.20		Circuit Breaker - .5 Amp
58741	20.80		Circuit Breaker - .3 Amp
58791	26.10		Circuit Breaker - 1 Amp
60154	7.10	S1821-13	Fan Fold Paper for Printer
64252-06	1.20		O-Ring 1/8 ID 1/16 W
64255-21	2.40		O-Ring Neoprene Pulley Belt
64413	5.10		Silicone Tubing, 10 OD x .048 ID
64427	4.70	S1821-12	PVC Tubing, 1/16 OD x .015 ID
64445	1.10	S1808-18	Latex Tubing, 3/16 x 3/32
65570	264.20		Atomizer Assembly
65571	248.90		Burner Assembly
65602	131.30		K-Li Switch Assembly Board
79143	15.80		143 Flame Photometer Instruction Manual
79144	15.80		144 Dilutor Instruction Manual
79243	15.80		243 Instruction Manual
79270	52.50	S1803-7A	Filter, Air W/79272 Elmt
79271	71.40	S1803-8A	Filter, Air W/79273 Elmt
79272	7.90	S1803-7B	Filter, Element Felt/79270
79273	27.30	S1803-8B	Filter, Element Textile/79271
79279	15.80		Instruction Manual - 279
79343	15.80		Instruction Manual - 343
87002-01	237.00		Burner Assembly - 143 RH
87002-03	248.90		Burner Assembly - 343 RH Plated
87003-01	241.60	S1805-6	Atomizer Assembly - 143 RH
87003-03	253.70		Atomizer Assembly - 343 RH Plated
87007	31.50		Air Hose Ferrule and Nuts, 143
87020	27.40		Element for 87019 Filter
87023	131.30		Ratio Regulator
87028	105.00		Fuel Regulator
87036	4.20		Styilet Assembly, 0.014 In Dia
87099	4.30	S1807-16	Aspirating Tube Kit, 3/pkg., 143/243/343
97517-50	10.50	S1803-112	140/5 Flame Standard/50 ampules
97518-50	10.50	S1803-115	120/2 Flame Standard/50 ampules
97519-50	10.50	S1803-117	160/8 Flame Standard/50 ampules
98993	52.50		Gas Tube Assembly

CLINICARD - 368, 390

<u>IL PART NO.</u>	<u>PRICE</u>	<u>S/P NO.</u>	<u>DESCRIPTION</u>
368	10500.00	B5610-1	Clinicard System, 120/60
390	2000.00	B5611-5	Clinicard SRI, 37 - 90 ⁰ C 120/60
390-01	2000.00	B5611-6	Clinicard SRI, 37 - 37 ⁰ C 120/60
390-02	2000.00	B5611-7	Clinicard SRI, 90 - 90 ⁰ C 120/60
20629	13.20		Replacement Test Card Kit
20630	18.40		Air Filter Replacement Kit
25014-01	49.40		Right Hand Grid Assembly
25014-02	49.40		Left Hand Grid Assembly
25019-01	111.30		Filter Ring, Opt 630 Assembly
25019-02	119.70		Filter Ring, Opt 525 Assembly
25019-03	114.50		Filter Ring, Opt 615 Assembly
25019-04	113.40		Filter Ring, Opt 404 Assembly
25019-05	114.50		Filter Ring, Opt 340 Assembly
25019-06	114.50		Filter Ring, Opt 455 Assembly
25019-07	113.40		Filter Ring, Opt 540 Assembly
27902	89.30	B5610-7	Test Cuvette Kit
27908	400.00	B5610-5	Thermo Pipette Assembly 115 V
27932	78.80	B5610-9	Procedure Organizer
27975	206.25	B5610-6	Cuvette Punch
79368	17.40		Instruction Handbook, 368

ELECTROPHORESIS - 373, 377

<u>IL PART NO.</u>	<u>PRICE</u>	<u>S/P NO.</u>	<u>DESCRIPTION</u>
373	850.00	E4510-5	373 Power Supply
377	4500.00	E4510-1	377 Densitometer
20904	6.10		Operators Manual, 373
20905	6.10		Operators Manual, 377
20906	4.50		Operators Manual Multi-Sample
25593	20.00	E4512-50	Chart Paper
28441	282.00		377 Accessory Package
28600	35.00		Staining Tray, Ctn. of 5
33205	27.50	E4512-42	Tris-Barbital Buffer
33206	24.50	E4512-41	Barbital/B-2 Buffer
36210	7.00		Liquid Ponceau S Stain, btl
42037	35.00		Optical Density Wedge
44377	1750.00	E4510-20	Digital Output Option, 377
49002-02	225.00		Electrophoresis Chamber
49005	200.00	E4510-10	Multi-Sample Applicator Ponceau S
49007-01	27.00	E4512-32	CAM, 25 x 168 mm Unpunched - 100/bx
49041	10.00	E4512-53	Wicking Paper
49079-02	27.50	E4512-55	Applicator Tip, Micro
49079-04	50.00	E4512-56	Applicator, Tip Macro
49191-80	65.00	E4512-21	Membrane Support, Clear Pkg. Set of 3
49197-30	11.00	E4512-12	S. A. G. Macro Yellow
49197-80	11.00	E4512-13	S. A. G. Micro Clear
49198	10.00	E4512-23	373 Roller
49202	10.00	E4512-24	Clearing Rack
49206-01	30.00	E4512-35	CAM, 57 x 145 mm Unpunched, 50/bx
49206-02	30.00	E4512-33	CAM, 57 x 145 mm Punched, 50/bx
49206-03	50.00	E4512-36	CAM, 57 x 145 mm, Unpunched, 100/bx
49206-04	52.00	E4512-34	CAM, 57 x 145 mm Punched, 100/bx
49207-02	32.00	E4512-30	CAM, 25.5 x 145 mm Punched, 100/bx
49207-04	55.00	E4512-31	CAM, 25.5 x 145 mm Punched, 200/bx
49208-02	4.00	E4512-51	Absorbent Paper, 60 x 80 mm
49208-03	15.00	E4512-52	Absorbent Paper, 150 x 280 mm
49210-21	85.00	E4512-5	Applicator Macro, Red
49210-81	62.50	E4512-3	Applicator, Clear Micro Wide
49222	15.00	E4512-25	Serum Plate for Single Sample Applicator
57538	1.80	E4512-61	Bulb Flange Base, 28V .04 Amp
77003	22.00	E4512-62	BXB Lamp, 377
77014	25.00	E4512-60	Pen Set - 3 for Densitometer

PRICE LIST

Cat. No.	Price	Cat. No.	Price
19010	\$ 18.90	41355	\$ 3.20
19030	31.50	41370	98.20
20902	49.30	41418	3.20
20982	63.60	41513	259.90
20983	259.90	41580	3.50
20984	231.00	41856-03	2.70
20985	144.40	41862	1.10
25701	495.30	41945	47.30
26090	536.00	42005-03	5.00
26096	250.00	44083	710.40
26125	35.00	44107	236.30
26160	58.00	44472	34.70
26213-01	21.00	44488	125.00
28236	512.32	44490	1,100.00
28251-01	837.40	44491	634.00
28341	63.00	44536	577.00
28366-01	249.00	44634	40.00
28379	398.00	44714	23.10
28769	82.00	44715	40.50
28771	310.00	44729	25.00
28776	357.00	44752	78.80
28779	214.00	44770	3.00
28782	394.00	44824	65.00
28785	324.00	44842	30.00
28788	194.00	44897-02	2.00
28791	432.00	50100	35.00
28794	412.00	50200	75.00
28875	250.00	50400	75.00
28895	223.00	51100	26.30
30113	8.40	51200	52.50
31060	7.60	52220	42.00
31060-10	68.10	52317	54.60
31070	9.80	52321	54.60
31070-12	107.50	55220	120.80
318	2,000.00	55220-01	80.90
33010	9.00	55321	115.50
33010-10	82.50	55321-01	94.50
33020	9.00	57464	152.30
33020-10	82.50	57465	152.30
33104	1.30	57573	.70
33104-06	9.90	58199	12.60
33109-12	20.80	58941	48.60
34030	8.10	64258-02	1.60
34030-12	89.00	72541	3.50
34070	2.70	72751	4.70
34070-12	28.70	78136-03	13.90
41111	6.30	78139	8.00
41220-02	68.30	79813	12.70
41250	3.20	813	13,000.00
41277-02	86.70	813-01	17,408.00
41288-01	5.30		

FOR ORDER

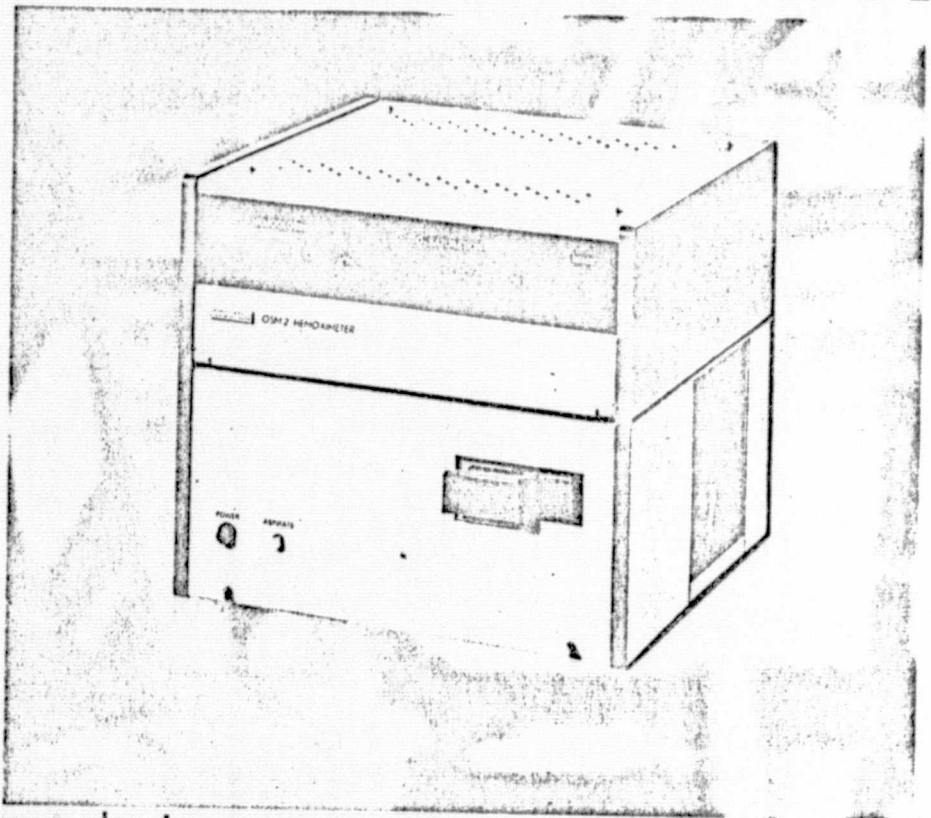
813

RADIOMETER

Copenhagen, Denmark

IIT RESEARCH INSTITUTE

OSM2 HEMOXIMETER



made to measure:

HEMOGLOBIN

g/dl

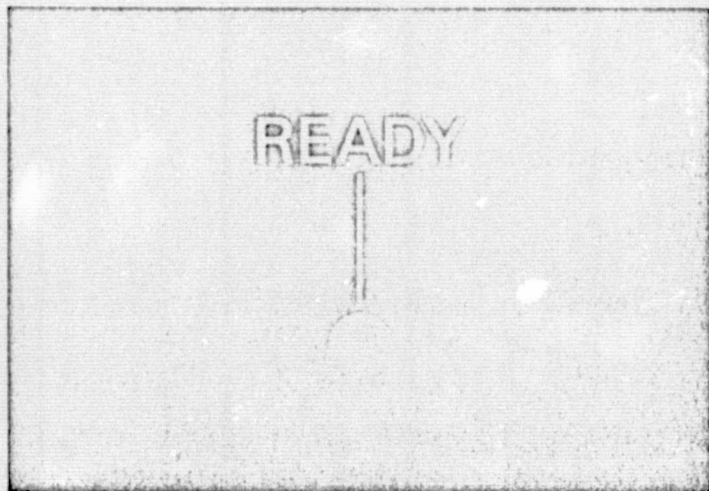
O₂ SATURATION

%

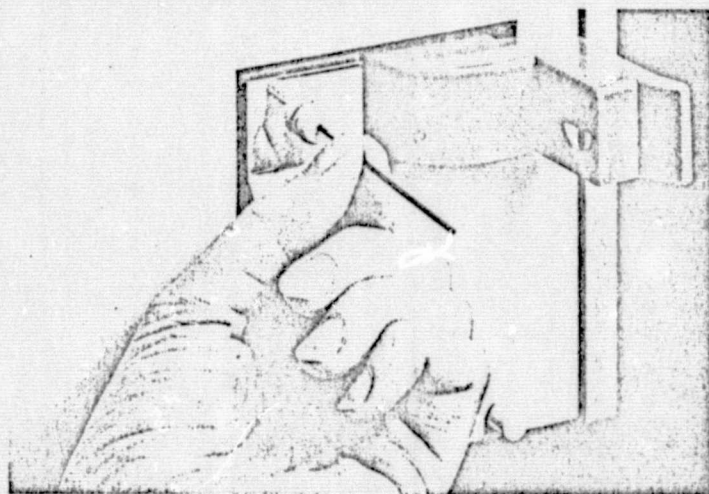
THE OSM2 HEMOXIMETER for

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

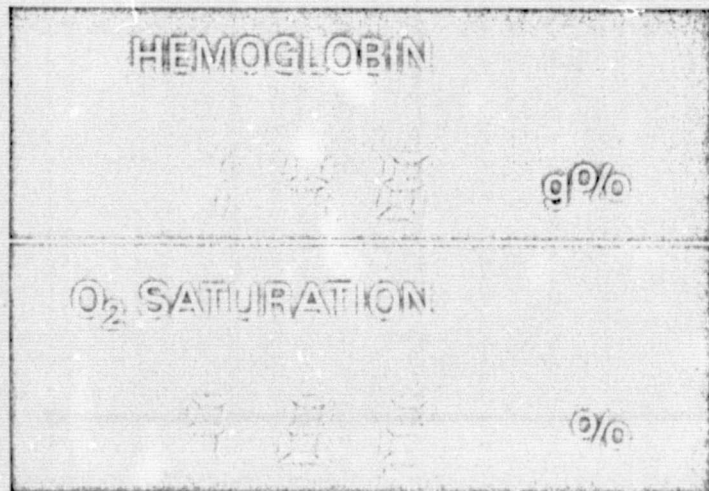
With the READY lamp on – the OSM2 is ready for a sample



Sample introduction



Read-out of results or print-out on an optional printer



- on WHOLE BLOOD – ULTRAMICRO 20 μ l samples
- measures samples from CAPILLARIES, SYRINGES or VACUTAINERS
- in just 20 SECONDS
- without ANY sample preparation
- always READY for use
- ADVANCED hemolyzing technique – no hemolyzing agents used.
- AUTOMATIC rinsing
- ONE daily zero point check
- SIMPLE daily rinsing procedure
- UNIQUE stability

With the development of the OSM2 Hemoximeter, Radiometer have taken another step forward in medical instrumentation. Thanks to its small sample requirements and the drastically reduced measuring time, the OSM2 brings new simplicity and accuracy to determinations of Hb concentration and O₂ saturation and eliminates operator fatigue.

All functions, from sample introduction to data presentation, are entirely automatic, and the OSM2 requires only a single daily zero point adjustment and rinsing procedure – both of which are performed in a few minutes.

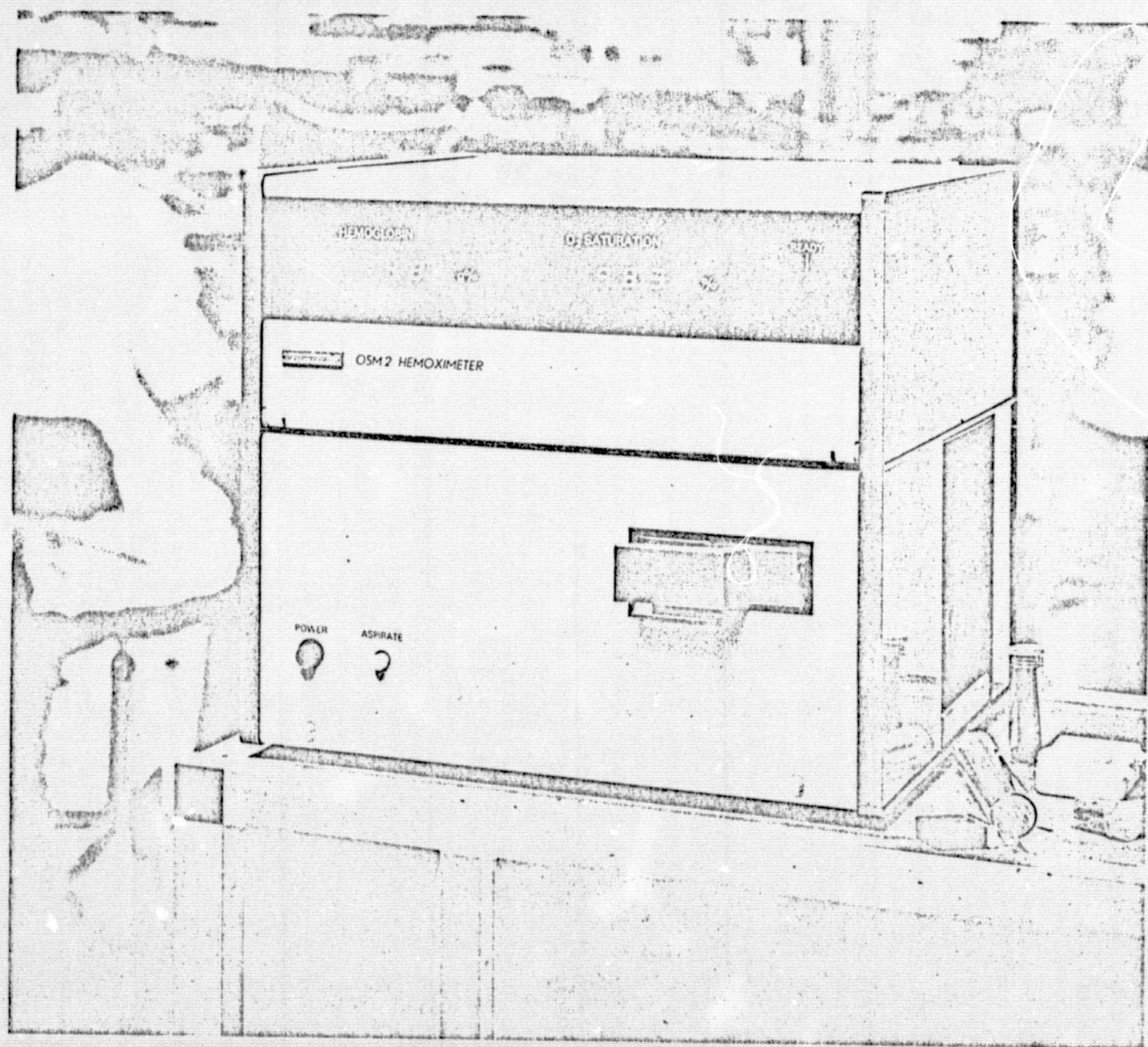
The unique ULTRASONIC hemolyzing technique used in the OSM2 has rendered superfluous all manual preparations of the sample prior to the measurement, such as mechanical separation, addition of chemical agents or dilution.

On their own, the small sample requirements, the extremely short measuring time, and the automatic rinsing place the OSM2 in a class by itself.

High-quality, solid-state electronics and state-of-the-art techniques ensure outstanding performance stability; so much so, that the OSM2 requires no more than four complete calibration checks per year. Because of this, the calibration settings are made on a sub-panel behind a hinged flap to prevent accidental misalignment during operation.

r FAST, EASY and ACCURATE measurements of Hemoglobin Concentration and O₂ Saturation

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SPECIFICATIONS

	Range	Repeatability	Accuracy SD
Hb	0-35 g %	0.40 at SAT = 100 % 0.50 at SAT = 0 %	0.60 at SAT = 100 %
SAT	0-100 %	0.5 at Hb = 8-35 g % 1.0 at Hb = 5-8 g %	

Sample volume: 20 μ l
 Sample handling time: 50 sec.
 Samples per hour: 55
 Warming-up period from cold condition: 10 min.
 Measuring temperature: $37.0 \pm 1^{\circ}\text{C}$
 Ambient temperature: $5^{\circ}\text{C}-30^{\circ}\text{C}$
 NaCl consumption: 500 μ l/sample
 Power: 110/220 V (95-130/190-260 V)
 50/60 Hz $\pm 5\%$
 50 VA
 Dimensions: Width: 30.5 cm
 Height: 27.5 cm
 Depth: 30 cm
 Weight: 11.8 kg
 Finish: Chemically resistant paint on aluminium

INTERFERING SUBSTANCES

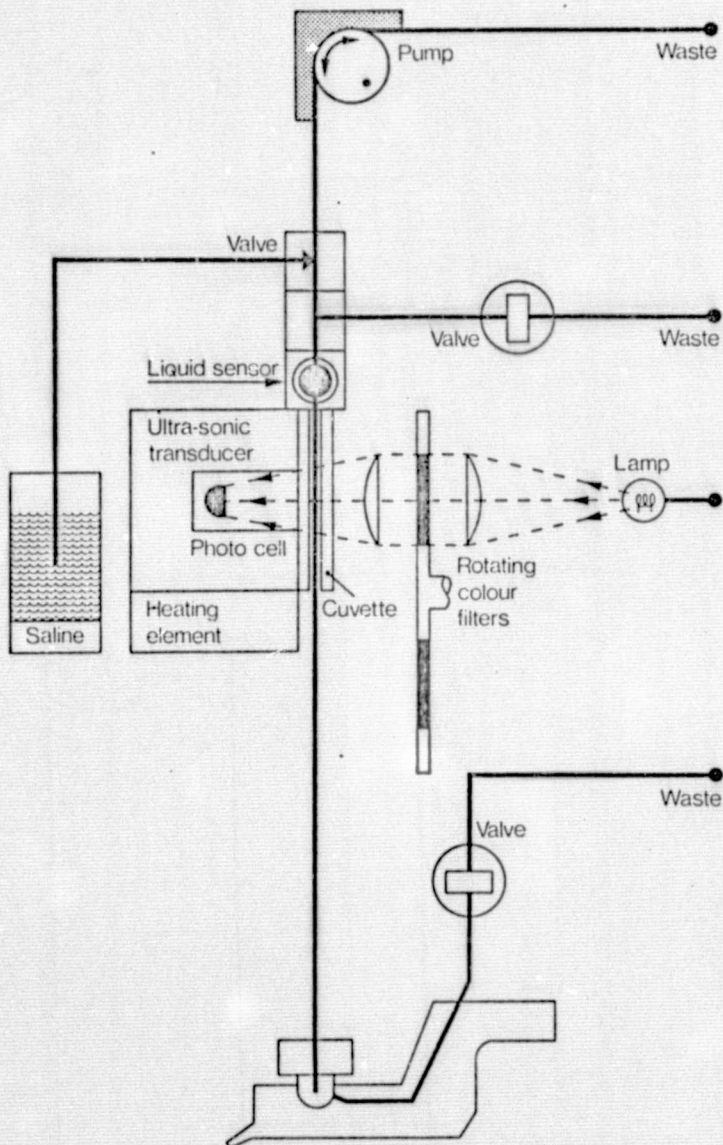
Normally these are Hi (methemoglobin) and COHb (carboxy-hemoglobin). SHb (sulfhemoglobin) is only very seldom present.

When Hi or COHb is present, the following corrections should be made:

	Hi		COHb	
	1 %	10 %	1 %	10 %
Hb reading (relative) too high	0.82 %	8.2 %	0.12 %	1.22 %
SAT = 0. Readings (absolute) too high. Per cent units	1.15	9.23	1.31	11.35
SAT = 100. Readings (absolute) too high. Per cent units	-0.79	-7.7	0.05	0.15

Data subject to change without notice.

US PATENTS PENDING



RAI

Your Factory Sales & Service Representative

MEDTRON CHICAGO, INC.

9665 Allen Ave. - P. O. Box 652

Rosemont, Illinois 60018

(312) 671-1770

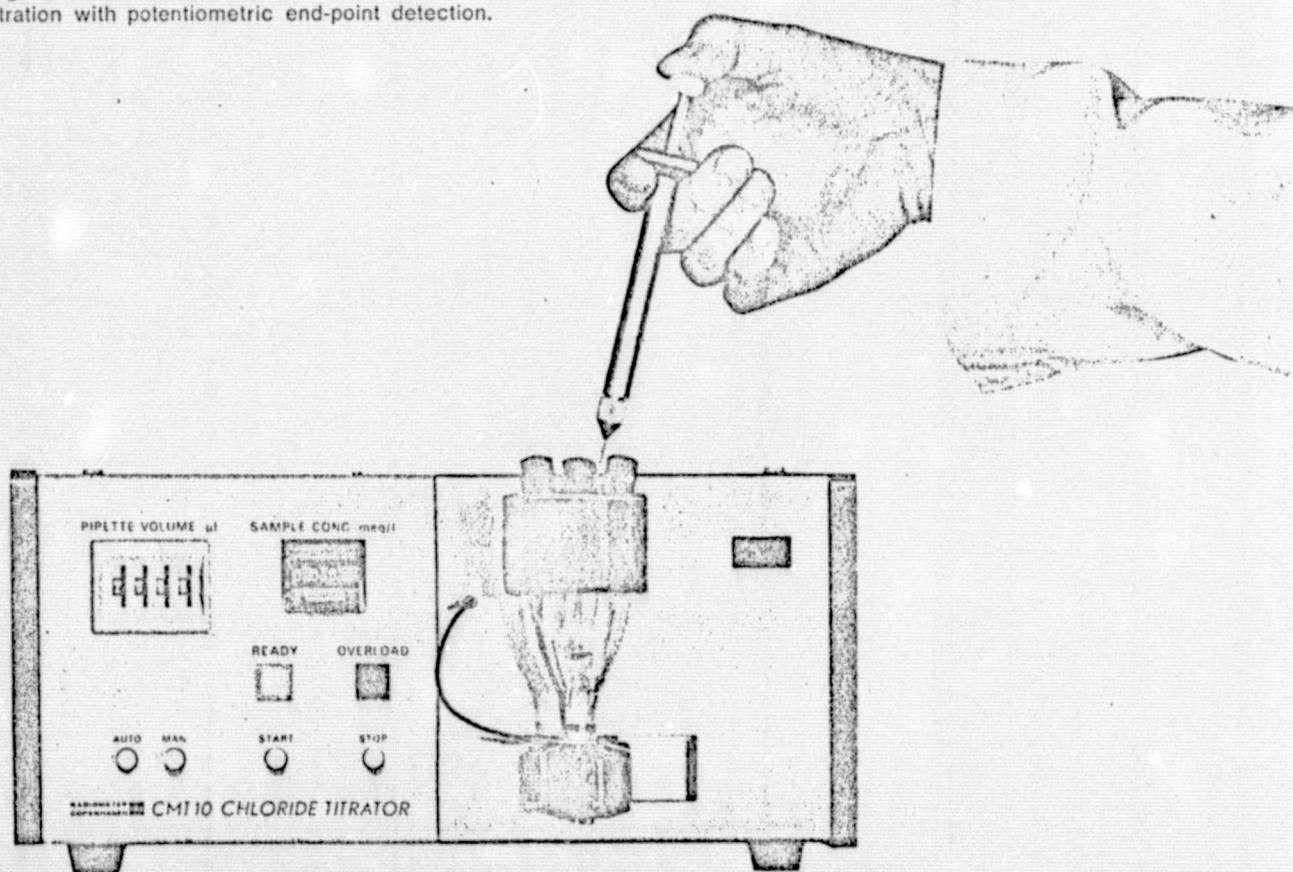
HAGEN NV · DENMARK

**RADIOMETER
COPENHAGEN**



CMT10 chloride titrator

A compact, easy-to-operate, direct-reading instrument for fast and reliable determinations of chloride concentration in micro samples within the range 0 to 999 meq/l. The principle of operation is coulometric titration with potentiometric end-point detection.



IT OFFERS YOU A WIDE RANGE OF APPLICATIONS

- clinical chloride determinations in serum or other body fluids
- industrial chloride determinations in food, beverages, soap, plastics, pharmaceuticals, etc.
- electrolyte balance determination in blood when used alongside FLM2 Flame Photometer
- water pollution control

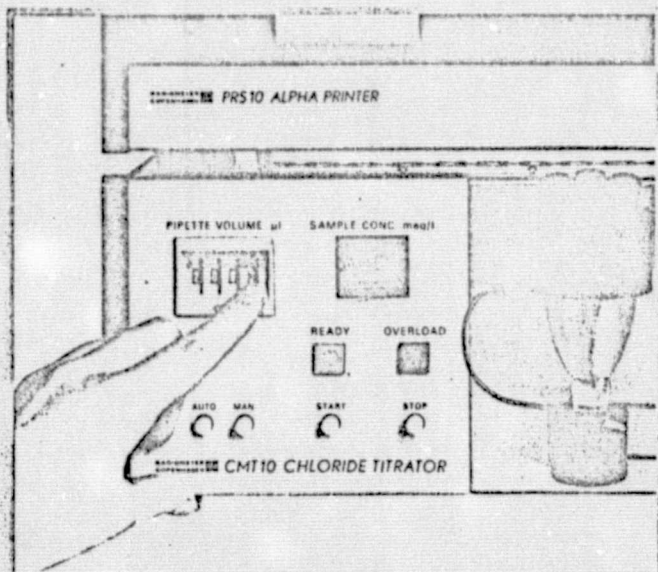
IT DOESN'T NEED ANY ...

- titration reagents
- colour indicators
- blank corrections
- calibration
- end-point setting
- particular attention

... BUT IT DOES HAVE THE FOLLOWING OUTSTANDING FEATURES:

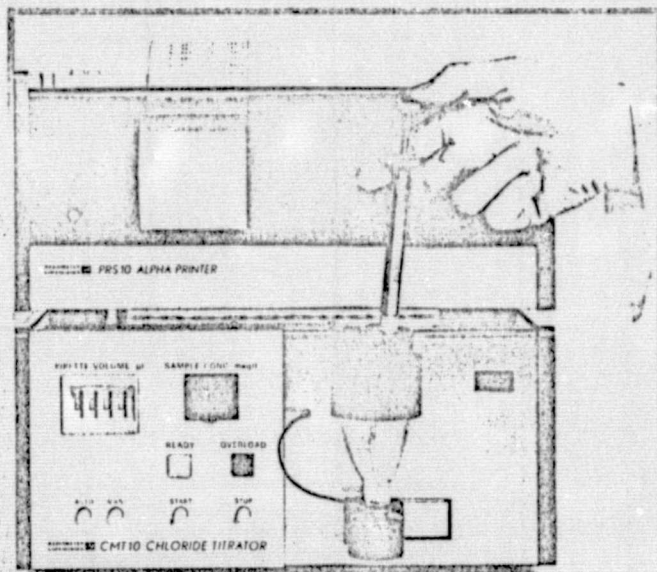
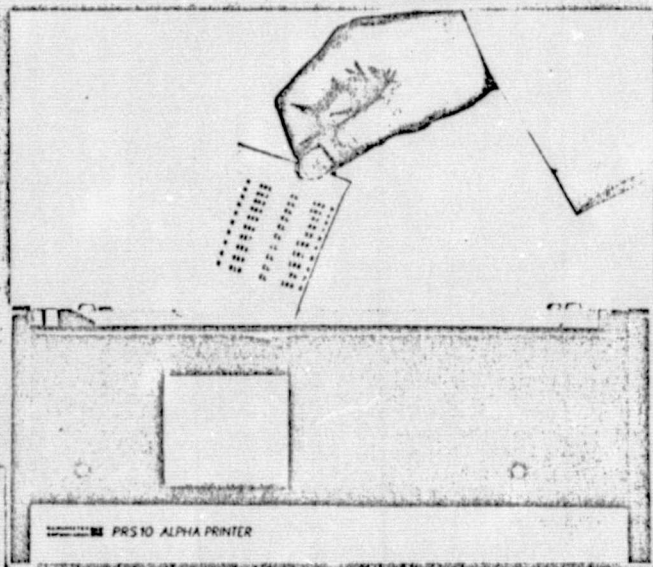
- handles micro samples from 1 to 29.99 µl
- analysis time approx. 25 sec. for 100 meq/l
- precalibration compensates for erratic pipette graduation
- no calculations – result displayed directly in meq/l
- accuracy:
 - with printer: $\pm 0.1 \text{ meq/l} \pm 0.5\%$
 - direct reading: $\pm 0.5 \text{ meq/l} \pm 0.5\%$
- no dials

Thanks to the sophisticated
solid-state construction
the CMT10 Chloride Titrator is ...



Set the pipette volume

Read the result on the counter or on the printer tape

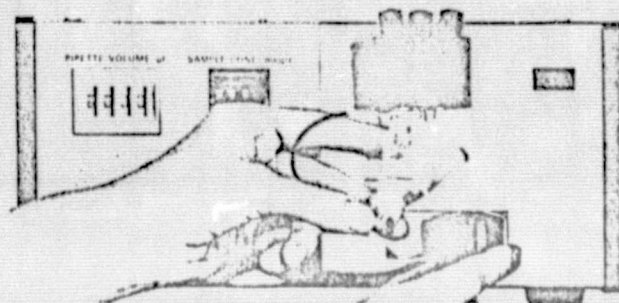


Introduce the sample with the micro-pipettor

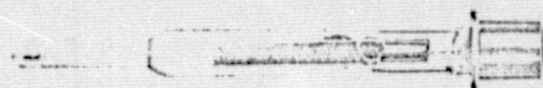
EASY TO OPERATE . . . Simply introduce the sample with the micro-pipettor, and the CMT10 starts the titration immediately. As soon as you get the result, you can inject the next sample, and so on. The unique "self-cleaning" silver anode makes it possible to perform multiple determinations without emptying the titration vessel. Extended series, such as 50 samples of 20 μ l each, can be quickly analyzed without cleaning or emptying the titration vessel.

The Alpha Printer can be utilized to record concentrations and sample identification numbers automatically. It also improves the accuracy by adding an extra decimal to the result.

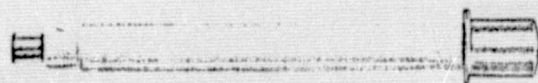
AND EASY TO MAINTAIN . . . The titration vessel is removed, emptied and remounted in a few seconds.



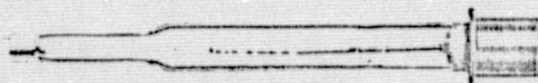
CMT10 chloride titrator



The K610 Hg/Hg₂SO₄ Chloride-free Reference Electrode



The P4401 Indicating Silver Electrode

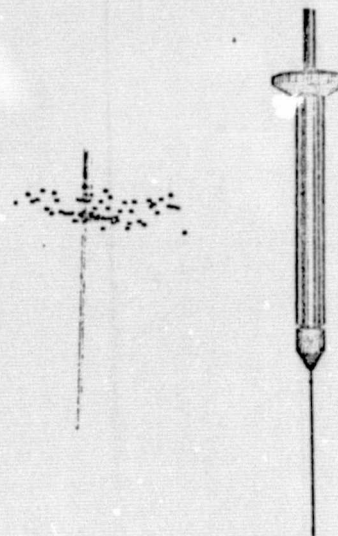


The P4402 Auxiliary Silver Electrode

Three of the four electrodes used for the coulometric titration of Cl⁻. The fourth electrode (the silver anode) is located in the bottom of the titration vessel.

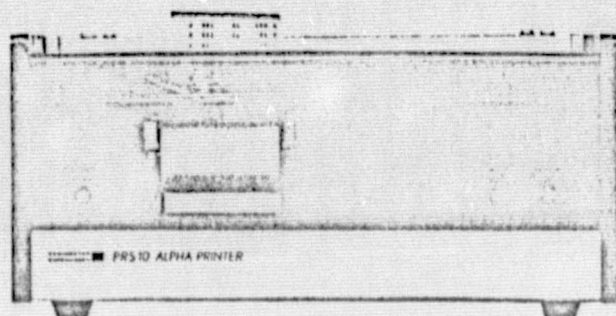
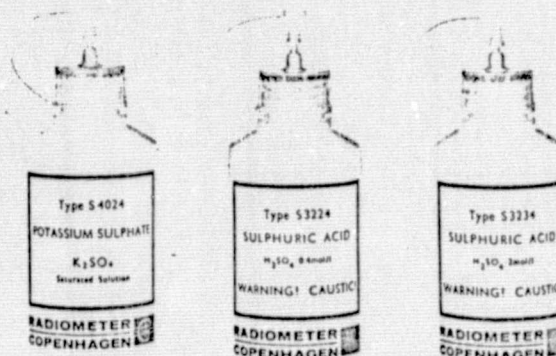
READY FOR USE. The CMT10 comes complete with all necessary electrodes and chemicals. Furthermore, the B106 Micro-Pipettor, which gives an easy and accurate pipetting of the sample, is supplied.

The Micro-Pipettor is equipped with a transparent glass pipette which makes it possible to check the sample level and to ascertain that no air bubbles are present. When a series of tests has been completed, the glass pipette is simply discarded and replaced by a new one.



The extremely accurate B106 Micro-pipettor.

Radiometer also delivers all necessary chemicals in order to ensure reliable measurements.



PRINTER RECOMMENDED:
PRS10 Alpha Printer for convenient,
automatic print-out

CMT10 chloride titrator

SPECIFICATIONS

SAMPLE VOLUME:	1-29.99 μ l. Preferred sample volume: 5-25 μ l
READOUT:	
Mechanical Counter:	0-999 meq/l, steps of 1 meq/l
Optional Electronic Counter for connection to printer:	0.0-999.9 meq/l, steps of 0.1 meq/l
MAX. ELECTRODE VOLTAGE:	35 V
ACCURACY:	with Printer ± 0.1 meq/l $\pm 0.5\%$ direct reading ± 0.5 meq/l $\pm 0.5\%$
DRIFT:	$< \pm 0.2\%$ for $\pm 10^\circ\text{C}$ temp. change and $\pm 10\%$ line voltage variation
POWER REQUIREMENTS:	115 V/220 V ac $\pm 15\%$. 47.5-63 Hz, 45 VA
AMBIENT TEMPERATURE:	0-45°C
DIMENSIONS:	
Height:	140 mm
Width:	300 mm
Depth:	290 mm
WEIGHT:	5.8 kg
CABINET:	grey enamelled aluminium

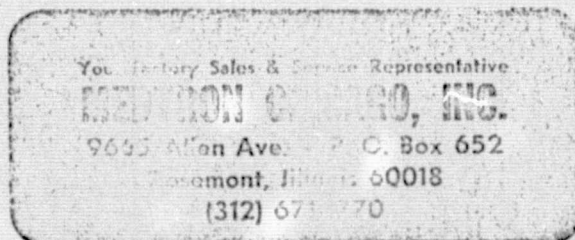
CMT10 COMES COMPLETE

with 1 B106 20 μ l Micro-pipettor, 50 disposable micro-pipettes, all electrodes needed, 3 P4413 Titration Vessels, all necessary chemicals and a dust cover.

ACCESSORIES AVAILABLE:

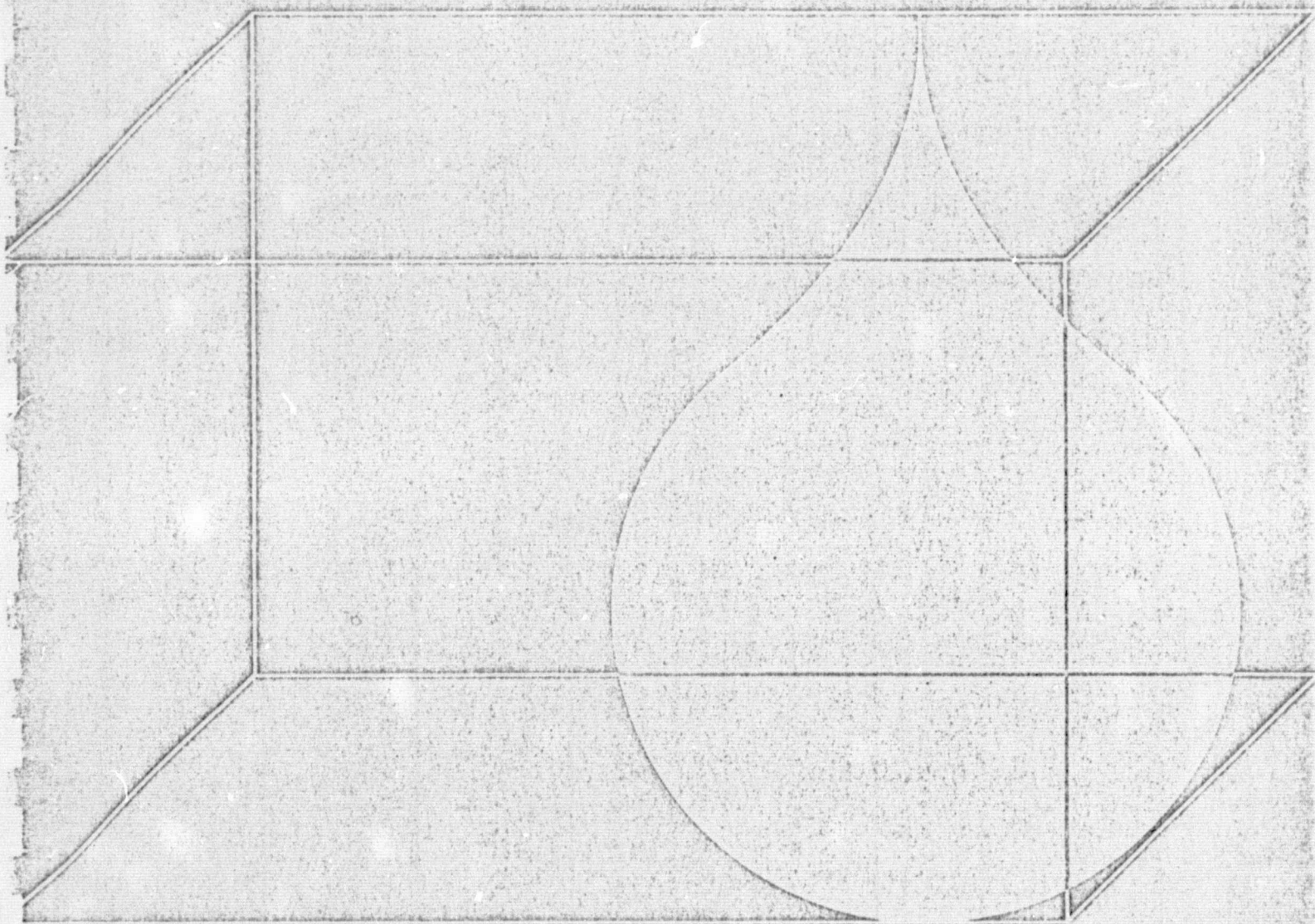
Code	Type	
900-351		BCD-Counter and Output
617-726		Cable with Multiplugs (50-50) for printer
912-036	10-D4030	Stirrer, 10 pcs.
945-148	P4413	Titration Vessel with Silver Electrode
943-603	S3224	Supporting Electrolyte, 100 ml
943-604	S3234	Sulphuric Acid, 2 M, 100 ml
943-300	S3506	Sodium and Chloride Standard, NaCl: 0.100 M, 500 ml
943-607	S4024	Saturated K ₂ SO ₄ Solution, 100 ml
943-615	S4170	Stabilizing Agent, 10 capsules
956-141	D682	Disposable Glass Micro-pipettes for B106, 500 pcs.

Data subject to change without notice



ABL1

Acid-Base Laboratory



a revolution
in blood acid-base
measurements

RADIOMETER
COPENHAGEN



So advanced:

Radiometer introduces the
ABL1 Acid-Base Laboratory:

The first truly automatic analyzer for the complete determination of pH-blood gas/acid-base balance.

ABL1 is fully automatic
ABL1 is self-calibrating
ABL1 is self-rinsing
ABL1 is easy to use. The results from ABL1 are more reproducible and reliable, because they are independent of operator routine.
ABL1 is always ready for use. It is therefore ideal for handling urgent samples ("STAT" analyses)

ABL1

So simple:

Let anyone fill 500 μ l of blood into the ABL1 (it simply cannot be done wrong!).

Wait a couple of minutes.

Collect *all relevant acid-base data* in printed form.

ABL1 measures:

PH	Actual pH
PCO2	Actual Pco ₂
PO2	Actual Po ₂
HB	Hemoglobin concentration
B	Barometric pressure

In addition, ABL1's built-in computer calculates the following parameters:

HCO3	Plasma Bicarbonate
TCO2	Total CO ₂
BE	Base Excess
SBE	Standard Base Excess
SAT	Oxygen Saturation
SBC	Standard Bicarbonate

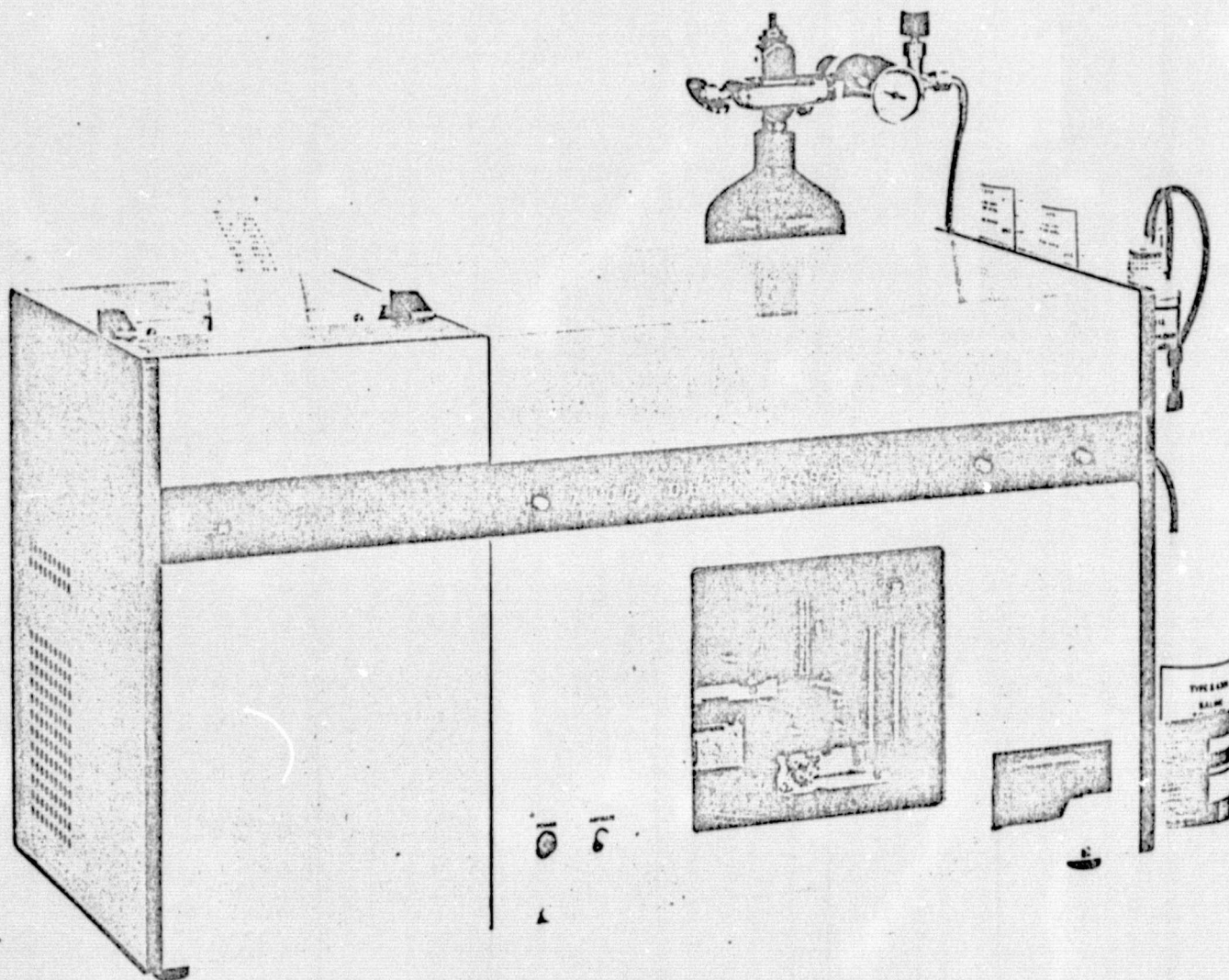
All data are presented as printout (unwanted calculated parameters can be electrically eliminated).

Quality and economy

In a single unit the ABL1 combines a diversity of operations which so far have been obtainable only from complicated and expensive setups. Furthermore, ABL1 includes significant new features as, for instance, the automatic self-calibrating capability that keeps it permanently calibrated.

ABL1 saves precious time in the laboratory and safeguards against errors in measurement and computation.

ABL1 is an advanced and accurate instrument – and yet it is surprisingly simple to use. Our determination through all development stages to avoid any complicated operations which could result in errors has, together with the use of the latest electronic microcomputer technology, led to a construction which both mechanically and electronically is remarkably simple – and, hence, extremely reliable.



What is new in ABL1?

ABL1 is the first truly ideal "STAT" instrument for pH-blood gas/acid-base analyses because of its many new automatic functions:

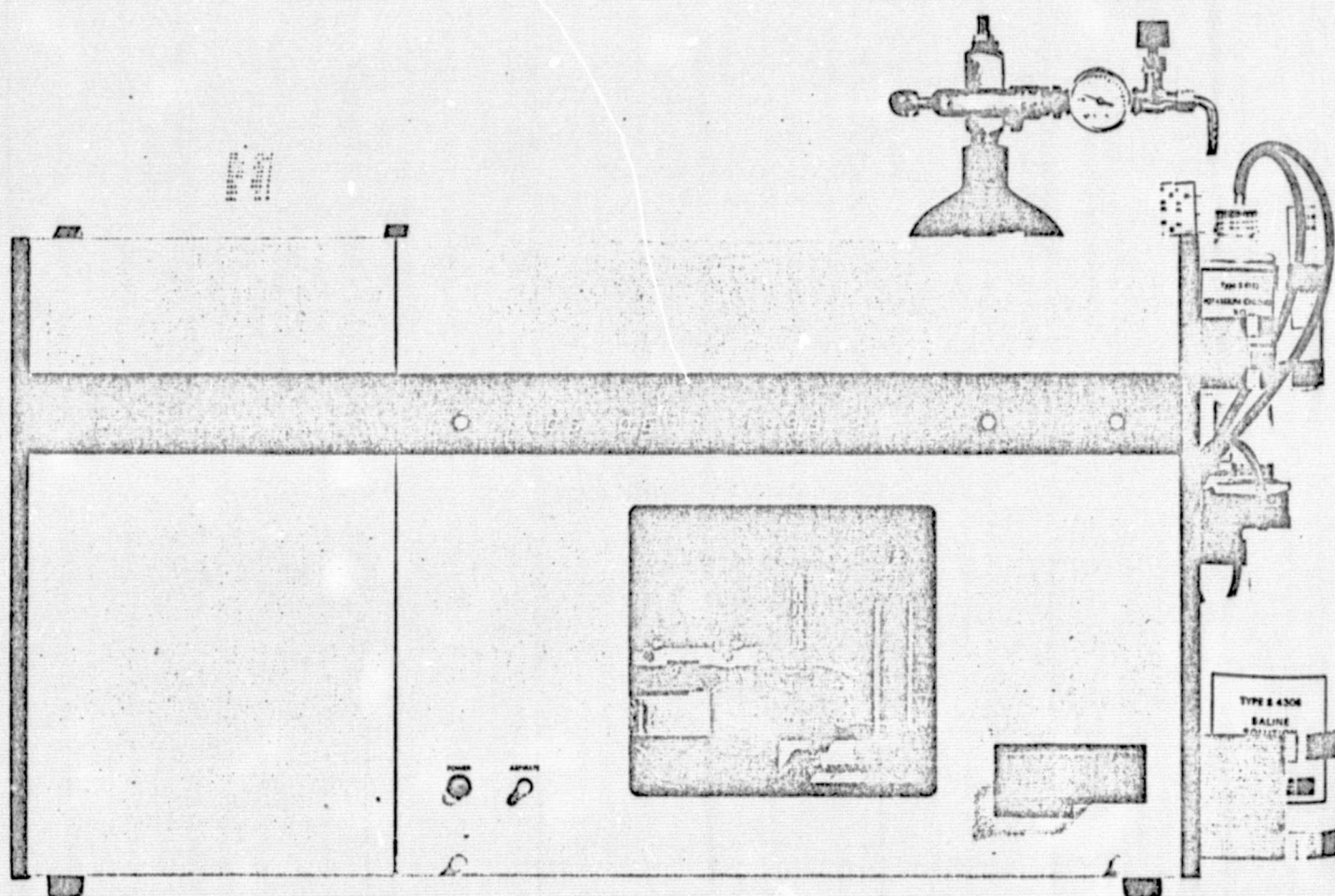
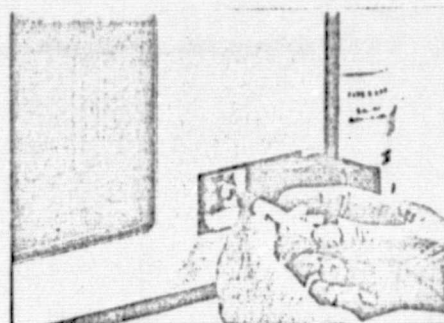
- Self-calibration
- Self-generation of calibration standards by equilibration of calibrating solutions with pure CO₂ and atmospheric air.
- Measurement of the barometric pressure and automatic correction for same
- Measurement of hemoglobin concentration and automatic correction for same
- Automatic flushing and rinsing after each measurement
- Built-in micro-computer for control and calculation

- Elimination of measuring errors resulting from faulty operation (e.g., during injection, rinsing, calibration or reading)
- Elimination of transcription errors thanks to the direct print-out facility
- Teleprinter-output for data transfer to external computer

ABL1 is the first pH-blood gas/acid-base analyzer to feature all the above mentioned properties and functions.

It is the first pH-blood gas analyzer which produces test results that are entirely uninfluenced by dissimilar operator techniques.

Operation



ABL1 is a fully automatic analyzer. All normal operations are limited to introducing a sample of whole blood and reading the results.

For special purposes, however, five push-buttons are provided:

- 1 Button RINSE will stop running measurements, if any, and start a complete rinsing and flushing programme.
- 2 Button CAL. will initiate a calibration programme.
- 3 Button PAPER feeds out more paper.
- 4 Button POWER operates the power switch and the electric main valve for the gas supply.
- 5 Button ASPIRATE is used when a sample is to be aspirated, e.g., from a test tube.

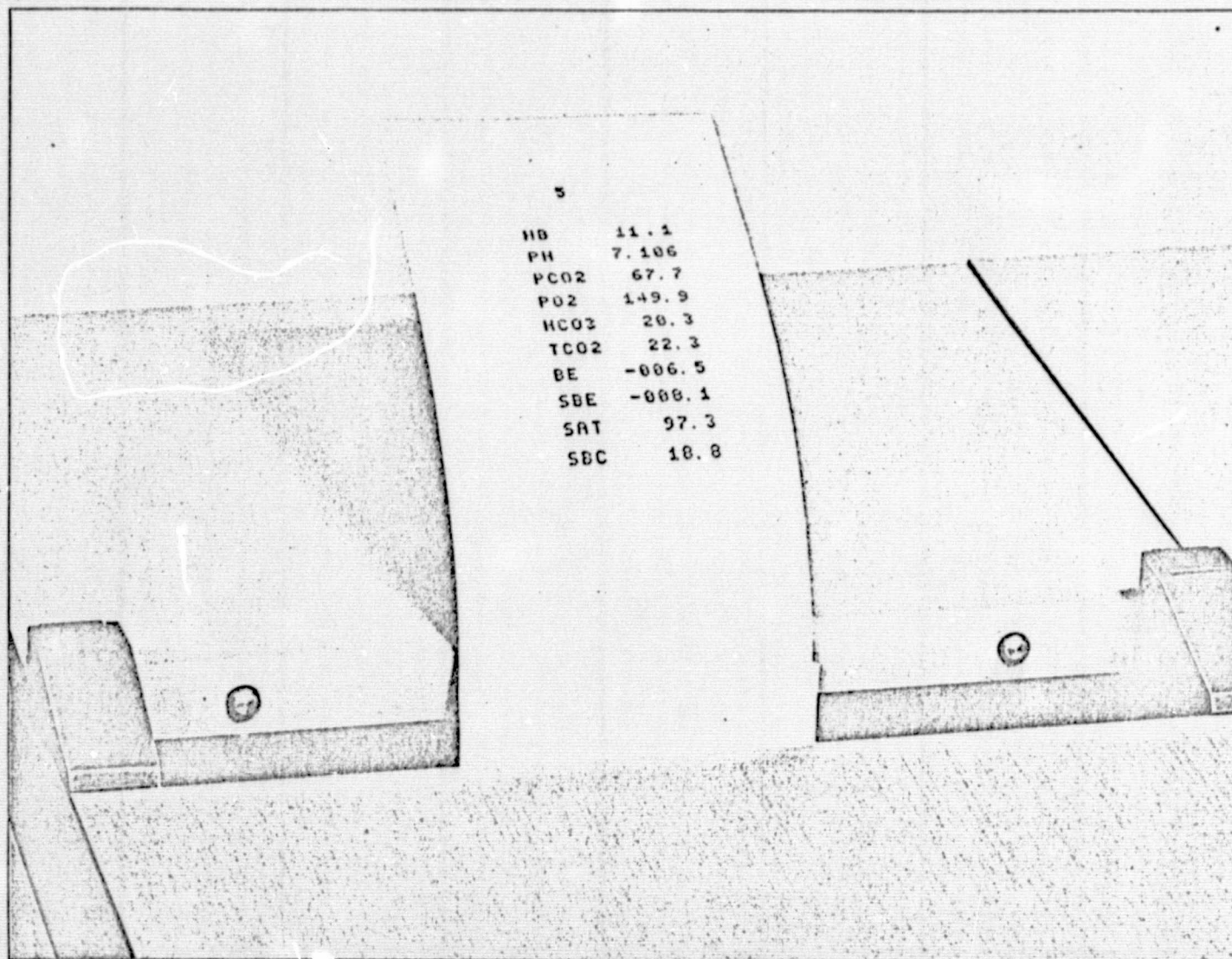
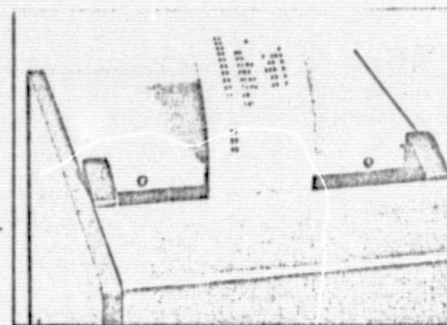
Presentation of the results

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pH, P_{CO_2} and P_{O_2} are indicated by three displays on the front of the ABL1.

All values measured and computed – including the above three – are printed out on the paper strip together with an identification number. Unwanted computed parameters may be omitted.

By adding the optional PRS11 Ticket Printer, also print-out on triple standard-format laboratory tickets is possible. Ask for further information.



Control

The built-in micro-computer controls and checks all functions of the ABL1.

In case of error in temperature, lack of gas supply, malfunctions of gas mixer, electrodes, pumps or valves, the printer will add question marks to the printed data to warn that the results may be unreliable.

Simultaneously, the displays for pH, P_{CO_2} and P_{O_2} will flicker to caution the operator of a possible error.

Six indicator lamps make it easier for the operator to supervise the various functions of the ABL1 by indicating the immediate operating conditions:

The TEMP. lamp flickers if the system is not at the proper temperature.

The GAS lamp flickers if the gas supply is not properly established.

The SAMPLE, CAL. and RINSE lamps indicate which of these three operations is being run at any given moment.

As soon as an adequate supply of blood has been introduced the SAMPLE lamp will light up, indicating that the inlet flap should be closed.

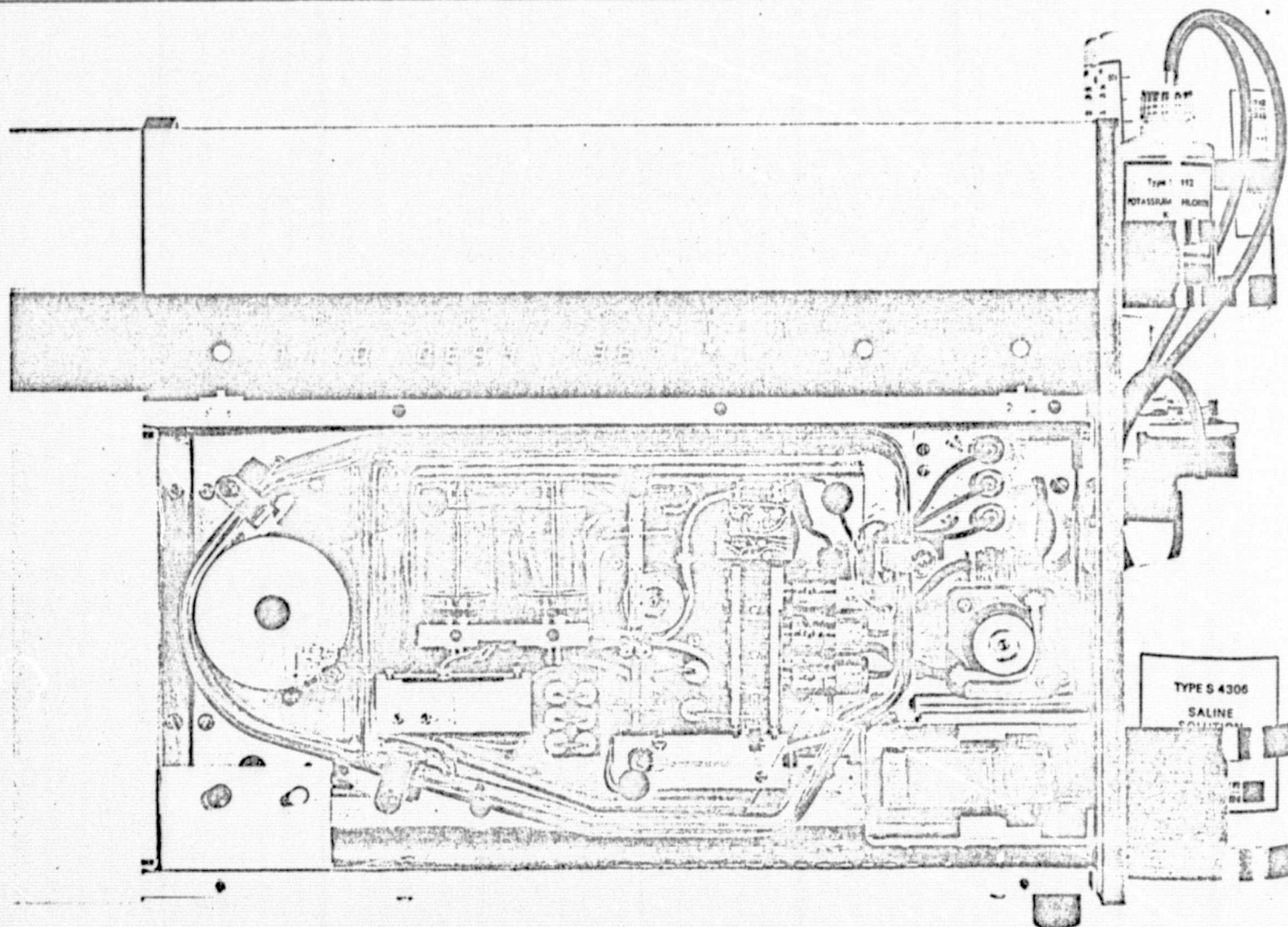
The READY lamp indicates that a new sample may be introduced.

A flickering lamp indicates that a malfunction has occurred during the corresponding programme.

The micro-computer is not used during "READY", but will automatically run a self-checking programme to ensure that no error enters the system unnoticed.

Mode of operation

The operating cycle of ABL1 can be subdivided into two principal functions: a blood analysis programme and a self-calibration programme. In addition, it is possible to run the rinsing operation as a separate programme.



The blood analysis programme

The blood sample is either injected or sucked into the sample chamber, where after the flap protecting the inlet tube is swung shut and automatically locked. As the flap closes, the sequence of automatic operations is set going in the following order:

- 1 The blood sample is pumped from the sample chamber towards the measuring chambers. Excess blood, if any, is drained off.
- 2 The blood sample is heated to 37° C.
- 3 The three electrode chambers for pH, Pco₂ and Po₂ and the cuvette of the hemoglobin photometer are filled.
- 4 KCl solution is injected to establish an open liquid junction to the reference electrode.
- 5 Measurements are performed (take approx. 1½ minutes): Signals from the four measuring sites are continuously transmitted to the micro-computer.
- 6 The computer corrects against the calibration values and continuously presents the pH, Pco₂ and Po₂ values on their respective displays.
- 7 The blood is pumped out through the waste outlet.
- 8 In the meantime the computer calculates the derived parameters. All wanted parameters are printed out by the built-in printer unit when they are ready.
- 9 Simultaneously, all parts that have been in contact with the blood are alternately rinsed with a 0.9% NaCl solution and ventilated with a gas mixture consisting of 5.6% CO₂ in atmospheric air.
- 10 The lamp READY lights up and the flap at the inlet is unlocked again. ABL1 is ready for the next sample.

The entire procedure is completed in less than 4 minutes, and the test results are ready after a mere 3 minutes.

The self-calibration programme

A calibration programme is automatically implemented every second hour. It will, however, await a pause in the normal flow of measurements and can be interrupted whenever measurements are to be made.

Two standard solutions of accurately known composition are utilized for calibration purposes.

The two standards are equilibrated with well-defined gas mixtures in their respective, built-in bubbling chambers so that calibrating solutions having accurately known pH, P_{CO_2} and P_{O_2} values are produced.

The sequence is as follows:

- 1 Conditioning with first calibration standard solution
- 2 Measurement on first calibration standard solution of pH, P_{CO_2} and Hemoglobin (which lies between 0 and 1.0)
- 3 Conditioning with second calibration standard solution
- 4 Measurement on second calibration standard solution of pH, P_{CO_2} and P_{O_2}
- 5 Complete rinsing programme
- 6 Print-out of the results during the rinsing
- 7 Calculation of the new calibration values using the actual barometric pressure as measured in the meantime by ABL1.
- 8 Substitution of the new calibration values for the old ones in the memory of the micro-computer – if the new values are approved by the computer programme.

Computation and print-out of the results obtained with the calibrating solutions are made on the basis of the calibration values previously fed to the memory of the ABL1. Print-out from an initial calibration after starting up the ABL1 is based on encoded, fixed values and may therefore be used to evaluate the absolute electrode properties.

The calibration procedure lasts 6 minutes, but it can be interrupted at any time by pressing button RINSE. In that case the ABL1 undergoes a complete rinsing programme and is then ready to receive a blood sample, whereafter the calibration is automatically restarted.

The rinsing programme

A separate rinsing and flushing programme for the entire blood system with 0.9% NaCl solution alternating with gas mixture can be performed at any time – by pressing button RINSE.

Build-up of ABL1

The instrument can be divided into three main sections:

The electronic section

All programmes are controlled from this section which also carries out corrective action and computations as well as all steps in the automatic regulation.

It contains the three galvanically isolated amplifiers for pH, P_{CO_2} and P_{O_2} , the HB-photometer amplifier, the analogue-to-digital converter, the function sensors, the micro-computer, the thermostating circuits and the power supplies.

The micro computer contains the memory and the programmes, and it makes all the calculations and malfunction checks. In addition, it provides all output signals for the warning and annunciator lamps as well as for the displays and the printer.

The electronic section is based on easily serviced standard plug-in printed circuit boards.

The wet section

This section comprises the measuring chambers with electrodes, the photometer, bubble chambers for equilibration of the two standard solutions, and valve tubes and two pumps for blood, 20% KCl, 0.9% NaCl solution, gases and calibrating solutions.

All parts that need thermostating are built into a transparent plastic chamber which is maintained at a temperature of 37° C by means of heated recirculating air. The window in the front panel makes it possible to observe the various stages in the operations. The operator can really see what is going on – also inside the transparent measuring chambers.

The gas section

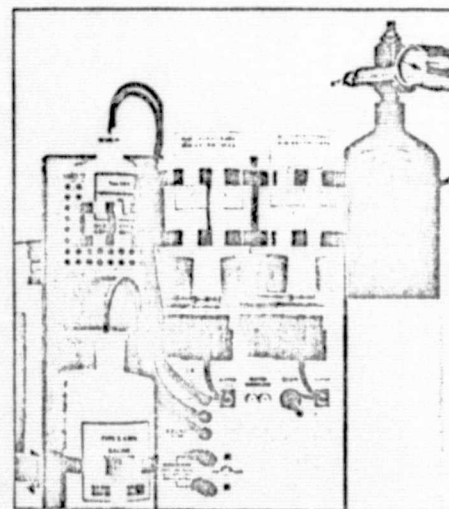
ABL1 is equipped with a gas mixer that mixes atmospheric air with pure CO_2 . It produces two gases of stable composition containing 5.61% CO_2 and 11.22% CO_2 , respectively, in atmospheric air.

These two gases are fed to the two separate bubbling chambers in the thermostatted part of the wet section, which thus contain a permanent supply of standard solutions for use in the automatic calibration. The gas mixer is not fitted with any operating controls, but it does have built-in regulating devices to ensure correct operation.

Supplies

Apart from ordinary mains supply, the following items are needed to operate the ABL1:

- 1 Two well-defined calibrating solutions. These are placed (in 1/2 litre bottles) in brackets on the right side of the instrument. Their contents are automatically fed to the two thermostatted bubbling chambers as need dictates. The bottles contain sufficient calibrating solution for approx. 10 days' continuous operation.
- 2 One 100 ml bottle of 20% KCl solution and one half-litre bottle of 0.9% NaCl solution. The ABL1 sucks up the solution directly from these bottles according to requirement. The consumption depends on the number of analyses performed. The bottles are within easy reach on the right-hand panel.
- 3 One 2.5 litre gas cylinder containing pure CO_2 and placed in a bracket on the rear of the instrument. Sufficient for approx. 60 days of continuous use.
- 4 Atmospheric air for gas mixer. Direct, filtered intake from environment.



Specifications

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Measured parameters:

	Guaranteed minimum ranges	Repeat-ability	Accuracy (absolute)
pH	6.300 to 8.000	± 0.003	± 0.008
Pco ₂ mmHg	5.0 to 150.0	$\pm 1\%$ of reading	$\pm 2\%$ of reading
Po ₂ mmHg	0.0 to 800.0	$\pm 1\%$ of reading	$10 < Po_2 \leq 150: \pm 1.5$
Hb g%	0.0 to 30.0	± 1.0	± 2.0
Barometer B mmHg	500 to 800	± 2	± 4

Derived parameters:

HCO ₃	Plasma Bicarbonate (Actual Bicarbonate)
TCO ₂	Total CO ₂
BE	Base Excess
SBE	Standard Base Excess (Extracellular Base Excess)
SBC	Standard Bicarbonate

These parameters are calculated with an accuracy equivalent to the accuracy of the Siggaard-Andersen Curve Nomogram.

SAT Oxygen Saturation
is calculated using the Hills equation corrected for pH with a Bohr factor of 0.48 and with P₅₀ fixed to 26.6 mm Hg.

Sample Volume	< 500 µl
Sample handling time	approx. 3 min from the flap is closed to print-out.
Samples per hour	Max. 14
Warming-up and buffer-conditioning period	2 hours from cold condition
Automatic recalibration:	2 hours from cold condition
Time interval	2 hours
Calibration time	6 minutes. May be interrupted for sample measurement.
Measuring Temperature	$37.0 \pm 0.1^\circ\text{C}$
Ambient Temperature	
without external cooling	+ 12 to + 30°C
with external water cooling	up to + 35 °C
Thermostating medium	Air
Identification numbers	1-9999
Power	110/220 V (95 - 130/190 - 260 V) 50 or 60 Hz $\pm 5\%$ (please specify), 235 VA
CO ₂ -consumption	One 2.5 litre bottle per 2 months
Cal. sol. consumption	1 bottle (0.5 l) of each per 10 days
NaCl consumption	1 ¹⁾ bottle (0.5 l) per week
KCl consumption	1 ¹⁾ bottle (100 ml) per week
Dimensions	Width: 730 mm Height: 370 mm Depth: 350 mm
Weight	35 kg

¹⁾ Typical value. Dependent on number of samples per day.

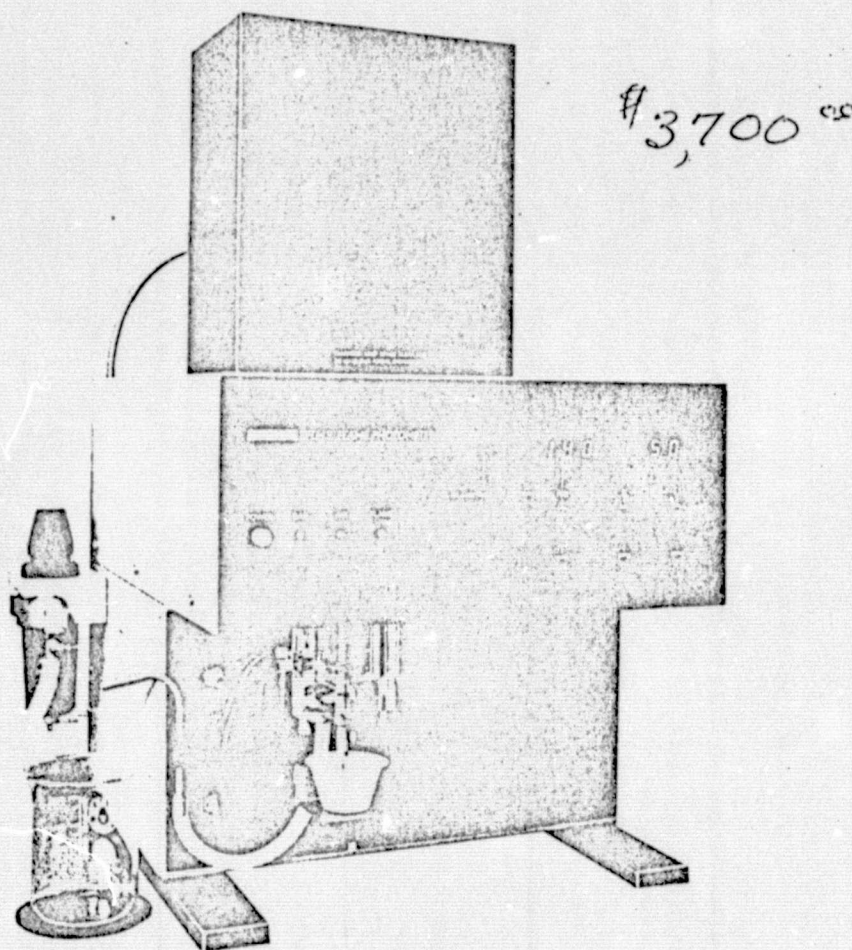
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US PAT. NO. 3,464,434

US AND OTHER PATENTS PENDING



FLM3 Flame Photometer



...for Na and K measurements in 6 seconds. Radiometer's FLM3 Flame Photometer has evolved from its predecessor instruments into the latest in the state-of-the-art in flame photometry. It makes quick and easy the determination of sodium, potassium, and lithium in blood serum and urine. FLM3 uses lithium as an internal standard when measuring sodium and potassium. Its new electronic compensation circuit, sensitive to variations in flame temperature and aspiration speed, provides greater stability, and speed in calibration and measurement. On a sample volume as low as 20 μ l it will produce a measurement in only 6 seconds.

FLM3's repeatability on the same diluted sample is ± 1 (last figure). Ranges: Sodium 0-180 mmol/l, Potassium 0.0-39.9 and 40-180 mmol/l (automatic shift). Lithium 0.0-10.0 mmol/l. Radiometer's PRS10 Alpha Printer (optional) will print out measured values opposite the appropriate symbols Na, K, or Li to avoid transcription errors.

Product Bulletin

PRICE LIST M62

medical instrumentation
& accessories

THE LONDON COMPANY

MEDICAL INSTRUMENTATION PRICE LIST M62
May 5, 1976

The London Company, 811 Sharon Drive, Cleveland, Ohio 44145
Telephone: (216) 871-8900

Terms: Net 30 Days - FOB Cleveland, Ohio
Minimum Billing \$10.00

ALPHA-NUMERICAL PRICE LIST ON PAGES 7 and 8

	Number	Description	Price
ACID-BASE ANALYZERS	ABL1	Acid-Base Laboratory	\$ 15000.00
	PHM71 Mark 2	Analog Version without Modules	1390.00
	PHM71 Mark 2	Analog Version with PO ₂ & PCO ₂ Modules	1990.00
	PHM72 Mark 2	Digital Version without Modules	2140.00
	PHM72 Mark 2	Digital Version with PO ₂ & PCO ₂ Modules	2645.00
	PHM73	Digital Acid Base Monitor	2945.00
ELECTRODE UNITS	BMS2 Mark 2	Equilibration Technique (Astrup) for total acid-base balance	2350.00
	BMS3 Mark 2	Direct Reading System, pH, PO ₂ , PCO ₂	2350.00
CUVETTES	D616	Thermostatted Cell for E5036 & E5046	360.00
	DS66014	Flow Through Cuvette, 2-3 ml volume	263.00
	DS67101	Flow Through Cuvette, 3-4 ml volume	289.00
OPTIONAL ACCESSORIES FOR ELECTRODE UNITS & ACID-BASE ANALYZERS	ABC2	Acid Base Cart	695.00
	GMA2	Gas Mixing Apparatus	1400.00
	1TK	Circulating Water Thermostat	532.00
	PHA934	PO ₂ Plug-in Module for PHM71 Mark 2 or or PHM72 Mark 2	322.00
	PHA935	PCO ₂ Plug-in Module for PHM71 Mark 2 or PHM72 Mark 2	390.00
	VTS13	Circulating Water Thermostat with Suction	595.00
	PRS11	Ticket Printer	2300.00
OPTIONAL ACCESSORIES FOR ABL-1	BMS3 Mark 2	Direct Reading System, pH, PO ₂ , PCO ₂	2350.00
	PHM73	Digital Acid Base Monitor	2945.00
	"E/D"	LG-202 Gas Cylinder, 5% CO ₂ , Balance N ₂	58.00
	"E/D"	LG-306 Gas Cylinder, 12% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	LR223	Gas Regulator - 2 required at \$125 each	250.00
	LB4040	Cylinder Base - 2 required at \$11.60 each	23.20
DIRECT READING SYSTEM (Common Cuvette)			

TOTAL 5686.20

NOTE: The above system can be made mobile with the addition of an Acid Base Cart, type ABC2. If the cart is utilized, it is necessary to delete the cylinder bases from the system.

	Number	Description	Price
COMBINED SYSTEM (Astrup with Direct Reading Electrodes)	BMS2 Mark 2	Equilibration Technique (Astrup for total acid-base balance).	\$ 2350.00
	D305	Support Arm for D616 to BMS2 Mark 2	36.00
	809-159	Rod for D305 Support Arm	9.50
	D616	Thermostatted Cell — 2 required at \$360 each	720.00
	D816	Accessory Kit for PCO ₂ (D616)	32.50
	D817	Accessory Kit for PO ₂ (D616)	20.50
	E5036/0	PCO ₂ Electrode for D616	201.00
	E5046/0	PO ₂ Electrode for D616	201.00
	PHM73	Digital Acid Base Monitor	2945.00
	"E/D"	LG-202 Gas Cylinder, 5% CO ₂ , Balance N ₂	58.00
	"E/D"	LG-303 Gas Cylinder, 4% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	"E/D"	LG-302 Gas Cylinder, 8% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	LR223	Gas Regulator — 3 required at \$125 each	375.00
	LB4040	Cylinder Base — 3 required at \$11.60 each	34.80
	TOTAL		7103.30

NOTE: The above system can be made mobile with the addition of an Acid Base Cart, type ABC-2. If the cart is utilized, it is necessary to delete the cylinder bases from the system.

	OSM-2	Hemoximeter	4150.00
FLAME PHOTOMETERS	FLM2	For Na and K (BCD Output Standard)	2725.00
	FLM2S1	For Na, K and Li (BCD Output Standard)	3350.00
OPTIONAL ACCESSORIES FOR FLAME PHOTOMETER	B41000	Single Ratio Diluter	425.00
	B41079	Aspirator Tube Assembly	20.20
	B41536	Air Line Filter Kit Assembly	69.00
	LG 102	Propane Gas Cylinders, Case of 12	52.00
	B41080	Compressor, 115 volts, 60 cycle	136.00
	B43000	Variable Ratio Diluter	590.00
	TS 240	Dilupette, Automatic Sampler, Diluter & Printer	1995.00
	5V 107	Disposable Beakers, 20 ml, 500 per pack	17.20
	LS5000	Lithium Diluent Solution, 5 gallons	36.00
SUGGESTED COMPLETE FLAME SYSTEM	FLM2	Flame Photometer for Na & K	2725.00
	TS240	Dilupette	1995.00
	B41080	Compressor, 115 volts, 60 Hz	136.00
	B41536	Air Line Filter Kit Assembly	69.00
	LG 102	Propane Gas Cylinders, Case of 12	52.00
TOTAL			4977.00

CHLORIDE TITRATOR	CMT10	Chloride Titrator Complete With Standard Accessories	1190.00
OPTIONAL ACCESSORIES	900-351	Binary Coded Decimal Module for Chloride Titrator	272.00
	PRS10	Alpha Printer	2500.00
	B106	Pipette for 20 micro liter sample w/capillaries	46.25
	D682	Disposable glass micro-pipettes Vial 500	37.00
	LSK100	Starter kit including pipette & solutions	54.50

	Number	Description	Price
DISSOCIATION CURVE ANALYZER	DCA1	Complete Dissociation Curve Analyzer with PHM71 Mk2 meters and Yew Recorder (Analog System)	\$ 14397.50
	DCA1	Complete Dissociation Curve Analyzer with PHM72 Mk2 meters and Yew Recorder (Digital System)	16647.50
PRINTERS	PRS10	Alpha Printer	2500.00
	PRS11	Ticket Printer for ABL-1	2300.00
pH ELECTRODES	G265C	For Flow Through Cuvettes	85.50
	G267C	For DCA1 only	129.00
	G268C	For ABL1 only	155.00
	G297	Water Jacket with insert G297/G2	280.00
	G297/V	Water Jacket less insert	213.00
	G297/G2	Insert for G297	86.75
	G298A	For BMS Units only	86.75
	G299A	For BMS2 Mark 2 & BMS3 Mark 2 only	110.00
PO ₂ ELECTRODES	E5042/0	Gas Phase for DCA1	205.00
	E5043/0	Liquid Phase for DCA1	219.00
	E5046/0	For D616 or Flow Through Cuvettes	201.00
	E5047/0	For BMS3 and BMS3 Mark 2	258.00
	E5048/0	For ABL-1 only	281.00
PCO ₂ ELECTRODES	E5036/0	For D616 or Flow Through Cuvettes	201.00
	E5037/0	For BMS3 and BMS3 Mark 2 only	258.00
	E5038/0	For ABL-1 only	281.00
REFERENCE ELECTRODES	K171	For BMS Units only	36.00
	K172	For BMS2 Mark 2 and BMS3 Mark 2 only	35.75
	K173	For ABL-1 only	74.25
	K412	For Flow Through Cuvette Type V170	88.00
	K4018	For DCA1 only	49.00
	K497	For Use with G297	104.00
	KS67053	For Flow Through Cuvettes only	120.00
ELECTRODES FOR CHLORIDE TITRATOR	K610	Mercurous Sulphate Electrode	30.50
	P4401	Silver Electrode	33.00
	P4402	Auxiliary Electrode	33.00
	P4413	Titration Vessel with Silver Anode	11.10
ELECTRODES (SPECIAL MEDICAL)	GK282C	Combined Stomach Electrode	178.00
	G502Na	Sodium Ion Electrode	99.00
GAS CYLINDERS	Radiometer (R) * Systems	Gases	
	(R) DCA	E ₂ cylinder 3% CO ₂ , Balance N ₂ E ₃ cylinder 4% CO ₂ , Balance O ₂	80.50 80.50
	(R) AME1	D ₁ cylinder 4% CO ₂ , Balance O ₂ D ₂ cylinder 8% CO ₂ , Balance O ₂	57.00 57.00
	(R) AMT1	LG-302 8% CO ₂ , 21% O ₂ , Balance N ₂ LG-303 4% CO ₂ , 21% O ₂ , Balance N ₂	60.00 60.00

* (R) Used to refer to gases used in Radiometer equipment

	Number	Description	Price
GAS CYLINDERS (cont.)	Systems	Gases	
	* (R) AMT1, 2D616	LG-202 5% CO ₂ , Balance N ₂	\$ 58.00
	1 E5036, 1E5046	LG-302 8% CO ₂ , 21% O ₂ , Balance N ₂	60.00
		LG-303 4% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	(R) BMS2 Mark 2	LG-302 8% CO ₂ , 21% O ₂ , Balance N ₂	60.00
		LG-303 4% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	(R) BMS2 Mark 2	LG-202 5% CO ₂ , Balance N ₂	58.00
	2 D616, 1E5036	LG-302 8% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	1E5046	LG-303 4% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	(R) BMS3 Mark 2	LG-202 5% CO ₂ , Balance N ₂	58.00
		LG-306 12% CO ₂ , 21% O ₂ , Balance N ₂	60.00
	(R) GMA1	LG-100 100% O ₂	48.00
		LG-101 100% CO ₂ (ABL1)	48.00
	IL-113	LG-203 10% CO ₂ , Balance N ₂	58.00
	IL-213 & IL-313	LG-304 5% CO ₂ , 12% O ₂ , Balance N ₂	60.00
	Corning Model	LG-203 10% CO ₂ , Balance N ₂	58.00
	161 & 165	LG-304 5% CO ₂ , 12% O ₂ , Balance N ₂	60.00
	All Flame Photometers	LG-102 Propane Gas Cylinders, Case of 12	52.00

All LG-200 and LG-300 series gases indicated above are priced as single units. When ordering four of a kind the price is reduced to \$53.00 each for LG-200 series and \$55.00 each for LG-300 series.

LG series of gases are disposable — NO DEPOSIT — NO RETURN

* (R) Used to refer to gases used in Radiometer equipment

REGULATORS	D665	Custom Gas Cylinder Regulator for ABL-1	200.00
	LR223	Custom Gas Cylinder Regulator for LG-200 and LG-300 series gases	125.00
PORTA-FRIDGE	LPFCO1/100	Disposable Caps (100 Quantity)	3.10/100
	LPFCO1/m	(1000 Quantity)	31.00/m
	LPFLO1	10 ml Size - (single sample reservoir)	19.80
	LPFLO2	10 ml Size - (double sample reservoir)	19.80
	LPFSO2	2-3 ml Size - (double sample reservoir)	19.80
SOLUTIONS AND BLOOD MEASURING ACCESSORIES	BGC1	Blood Gas Calculator — 1 Cursor, (Man & Animal)	44.50
	D550/7.5/60	Blood Sampling Kit for BMS2 Mark 2	18.40
	D550/10	Blood Sampling Kit for BMS2	18.40
	D550/12.5/140	Blood Sampling Kit for BMS3 Mark 2	18.40
	D550/12.5	Blood Sampling Kit for BMS3	18.40
	D680/7.5	Blood Sampling Kit for OSM1	25.70
	D551/7.5/60	Capillary Tubes For BMS2 Mark 2	10.40
	D551/10	Capillary Tubes For BMS2	10.40

**SOLUTIONS AND
BLOOD MEASURING
ACCESSORIES
(cont.)**

Number	Description	Price
D551/12.5/140	Capillary Tubes for BMS3 Mark 2	\$ 10.40
D551/12.5	Capillary Tubes for BMS3	10.40
D551/15	Capillary Tubes (app. 150 μ l) for all BMS units	13.50
D551/20	Capillary Tubes (app. 200 μ l) for all BMS units	16.10
D551/30	Capillary Tubes (app. 300 μ l) for all BMS units	20.20
D551S	Vial Mixing Wires (100 per vial)	1.30
D553	Sealing Wax	4.80
D571	Magnet	4.80
D602	Membrane, Teflon for PCO ₂ Electrodes, Box of 15	4.00
D604	Membrane, Polypropylene for PO ₂ Electrodes, box 25	6.00
D606	Silicone Film for PCO ₂ Electrodes, Box of 15	22.00
D665	Regulator for ABL-1	200.00
D681/7.5	Capillary Tubes OSM1 only	20.50
D697	Nylon Spacer for PCO ₂ Electrodes, vial of 25	3.70
D810	Accessory Kit for PCO ₂ Electrodes (E5038) for ABL-1 only (904-103)	20.50
D811	Accessory Kit for PO ₂ Electrodes (E5048) for ABL-1 only (904-104)	20.50
D814	Accessory Kit for PCO ₂ Electrodes (E5037/0) for BMS Units (904-121)	32.50
D815	Accessory Kit for PO ₂ Electrode (E5047/0) for BMS Units (904-122)	20.50
D816	Accessory Kit for PCO ₂ Electrode (E5036/0) D616 (904-123)	32.50
D817	Accessory Kit for PO ₂ Electrode (E5046/0) D616 (904-124)	20.50
LR223	Regulator	125.00
LS101	Supporting Electrolyte Solution for CMT10	6.00
LS102	2 Molar Sulphuric Acid for CMT10	5.00
LS110	Chloro-Kit for CMT10	9.75
LS5000	Lithium Diluent Solution, 5 gallons	36.00
S1306	Buffer, 500 ml, 1.68 pH	6.20
S1316	Buffer, 500 ml, 4.01 pH	6.20
S1326	Buffer, 500 ml, 7.00 pH	6.20
S1336	Buffer, 500 ml, 9.18 pH	6.20
S1346	Buffer, Clinical, 500 ml, 6.84 pH	6.20
S1356	Buffer, Clinical, 500 ml, 7.38 pH	6.20
S1500/30	Buffer, Certified Ampoules, 6.841 pH box of 30	15.50
S1510/30	Buffer, Certified Ampoules, 7.383 pH box of 30	15.50
S1546	500 ml Calibrating Solution for ABL-1 only (6.841)	8.50
S1546/12	Case of S1546 (12 bottles)	99.50
S1556	500 ml Calibrating Solution for ABL-1 only (7.383)	8.50
S1556/12	Case of S1556 (12 bottles)	99.50
S3022	Borax Solution, 0.01 Molar	6.20
S3306	Concentrated Lithium Standard Solution, 500 ml (replaces B41071)	11.80
S3316	Bottle, empty-500 ml for Lithium Solution	3.95
S3326	Standard 140 Na/5K, 500 ml (replaces B41072)	11.80
S3336	Standard 100 Na/100K, 500 ml (replaces B41073)	11.80
S3346	Non-Ionic Wetting Agent, 500 ml for FLM2S1 only (replaces B41504)	7.05
S3356	Bottle, empty-500 ml for wetting agent	3.95
S3366	1.5 Li/140 Na/5K, 500 ml for FLM2S1 only (replaces B41503)	11.80
S3506	Na and Cl Standard	6.25
S4004	Saturated KCL Solution, 100 ml	5.95
S4024	Saturated K ₂ SO ₄ Solution, 100 ml	6.70

	Number	Description	Price
SOLUTIONS AND BLOOD MEASURING ACCESSORIES (cont.)	S4042	Sodium Sulphite Crystals	\$ 6.70
	S4054	Electrolyte Solution, for PCO ₂ Electrodes 100 ml	7.85
	S4064	Electrolyte Solution, for PO ₂ Electrodes 100 ml	7.85
	S40912	Thermostat Water Additive (VTS13)	9.00
	S4100	Thermostat Water Additive (BMS)	8.40
	S4112	KCL Solution (BMS and ABL-1 Units) 100 ml	6.25
	S4112/10	Case of S4112 (10 bottles)	62.50
	S4124	NaCl Solution, 0.9%, 100 ml	6.70
	S4150/30	PO ₂ Zero Solution 30 ampoules	19.40
	S4160	Enzymatic Electrode Detergent, box of 10 capsules	3.30
	S41412	Packets of 20 Grams KCL (BMS and ABL Units) 10 packets	9.40
	S4306	500 ml—Saline Solution for ABL-1	5.80
	S4306/12	Case of S4306 (12 bottles)	69.50
	S5224	Manometer Fluid for GMA1	7.80
	S5262	Cleaning Solution	5.70
	S5312	Protein Cleansing Solution 100 ml	8.80
BOOKS	984-600	<i>Introduction to Acid-Base and Electrolyte Balance</i> by Gosta Rooth	6.50
	984-606	<i>Clinical Acid-Base and Electrolyte Balance</i> by Gosta Rooth	9.00
	984-602	<i>Acid-Base Physiology in Medicine</i> by Drs. Winter, Dell, and Engel. A programmed self instruction book. Please write for details and order form.	7.25
	984-603	<i>Acid-Base Status of the Blood</i> by O. Siggaard Andersen. Extensively revised 4th Edition	25.50
	984-604	<i>pH Measurements in Theory and Practice</i> by Niels Linnet	6.20
		<i>Studies on Acid-Base and Electrolyte Components of Human Foetal and Maternal Blood During Labour</i> by Lennart Jacobson	9.50
		<i>Technician Training Manual</i> by The London Company	10.00
		<i>ABL-1 Technician Training Manual</i> by The London Company	10.00
Note: Since all books are provided as a service to the medical profession, only prepaid orders will be accepted. Please be sure your check accompanies your order. Thank you.			
NOMOGRAMS (Pads of 50)	984-200	(A3) Curve Nomograms (large)	16.50
	984-201	(A4) Curve Nomograms (small)	7.85
	984-202	(A4) Case History Diagrams	7.80
	984-203	(A4) Alignment Nomograms	7.85
	984-204	(A4) PO ₂ —O ₂ % Saturation Nomograms	7.85
	984-208	Siggaard Andersen Acid Base Chart Nomogram	9.30
TRAINING AIDS & OTHER SERVICES	ACID—BASE TRAINING AID ABT1 RENTAL PROGRAM 2 weeks for \$100 net. Please write for details		
	ASTRUP WALL HANGER Free to Astrup Users An attractive wall chart describing equilibration techniques for acid base studies. Good for quick reference.		
	TECHNICIAN TRAINING SCHOOLS For Radiometer users primarily. Please write for details		
	35mm COLOR SLIDES — \$125 complete set Based on the book, "Acid-Base Physiology in Medicine". Please write for details		

ALPHA-NUMERICAL
PRICE LIST
OF COMPONENTS

Number	Price	Number	Price
ABC2	\$ 695.00	FLM2S1	\$ 3350.00
ABL-1	15000.00	G265C	85.50
BGC1	44.50	G267C	129.00
BMS2 Mark2	2350.00	G268C	155.00
BMS3 Mark2	2350.00	G297	280.00
B106	46.25	G297/G2	86.75
B41000	425.00	G297/V	213.00
B41079	20.20	G298A	86.75
B41080	136.00	G299A	110.00
B41536	69.00	GK282C	178.00
B43000	590.00	G502Na	99.00
B545	35.00	GMA2	1400.00
CMT10	1190.00	K4018	49.00
D305	36.00	K171	36.00
D550/7.5/60	18.40	K172	35.75
D550/10	18.40	K173	74.25
D550/12.5/140	18.40	K412	88.00
D550/12.5	18.40	K497	104.00
D551/7.5	10.40	K610	30.50
D551/10	10.40	KS67053	120.00
D551/12.5/140	10.40	LB4040	11.60
D551/12.5	10.40	LPFCO1/100	3.10/100
D551/15	13.50	LPFCO1/m	31.00/m
D551/20	16.10	LPFLO1	19.80
D551/30	20.20	LPFLO2	19.80
D551/40	24.20	LPFSO2	19.80
D551S	1.30	LR223	125.00
D553	4.80	LS101	6.00
D571	4.80	LS102	5.00
D602	4.00	LS110	9.75
D604	6.00	LS5000	36.00
D605	2.50	LSK100	54.50
D606	22.00	OSM-2	4150.00
D616	360.00	P4401	33.00
D665	200.00	P4402	33.00
D680/7.5	25.70	P4413	11.10
D681/7.5	20.50	PHA934	322.00
D682	37.00	PHA935	390.00
D697	3.70	PHM71 Mark 2	1390.00
D810	20.50	PHM71 Mark 2	1990.00
D811	20.50	PHA934/PHA935	
D814	32.50	PHM72 Mark 2	2140.00
D815	20.50	PHM72 Mark 2	2645.00
D816	32.50	PHA934/PHA935	
D817	20.50	PRS10	2500.00
DCA1	5990.00	PRS11	2300.00
DS66014	263.00	S1306	6.20
DS67101	289.00	S1316	6.20
E5036/0	201.00	S1326	6.20
E5037/0	258.00	S1336	6.20
E5038/0	281.00	S1346	6.20
E5042/0	205.00	S1356	6.20
E5043/0	219.00	S1500/30	15.50
E5046/0	201.00	S1510/30	15.50
E5047/0	258.00	S1546	8.50
E5048/0	281.00	S1546/12	99.50
FLM2	2725.00	S1556	8.50

ALPHA-NUMERICAL
PRICE LIST
OF COMPONENTS
(cont.)

Number	Price
S1556/12	\$ 99.50
S3022	6.20
S3306	11.80
S3316	3.95
S3326	11.80
S3336	11.80
S3346	7.05
S3356	3.95
S3366	11.80
S3506	6.25
S4004	5.95
S4024	6.70
S4042	6.70
S4054	7.85
S4064	7.85
S40912	9.00
S4100	8.40
S4112	6.25
S4112/10	62.50
S4124	6.70
S4150/30	19.40
S4160	3.30
S41412	9.40
S4306	5.80
S4306/12	69.50
S5224	7.80
S5262	5.70
S5312	8.80
V170	62.00
VT513	595.00
V107	17.20
809-159	9.50
848-008	16.50
887-620	1.20
900-351	272.00
921-157	7.10
950-139	18.60
984-044	9.55
984-046	28.50
984-200	16.50
984-201	7.85
984-202	7.80
984-203	7.85
984-204	7.85
984-208	9.30
984-600	6.50
984-602	7.25
984-603	25.50
984-604	6.20
984-606	9.00
991-527	1.00
991-200	.80

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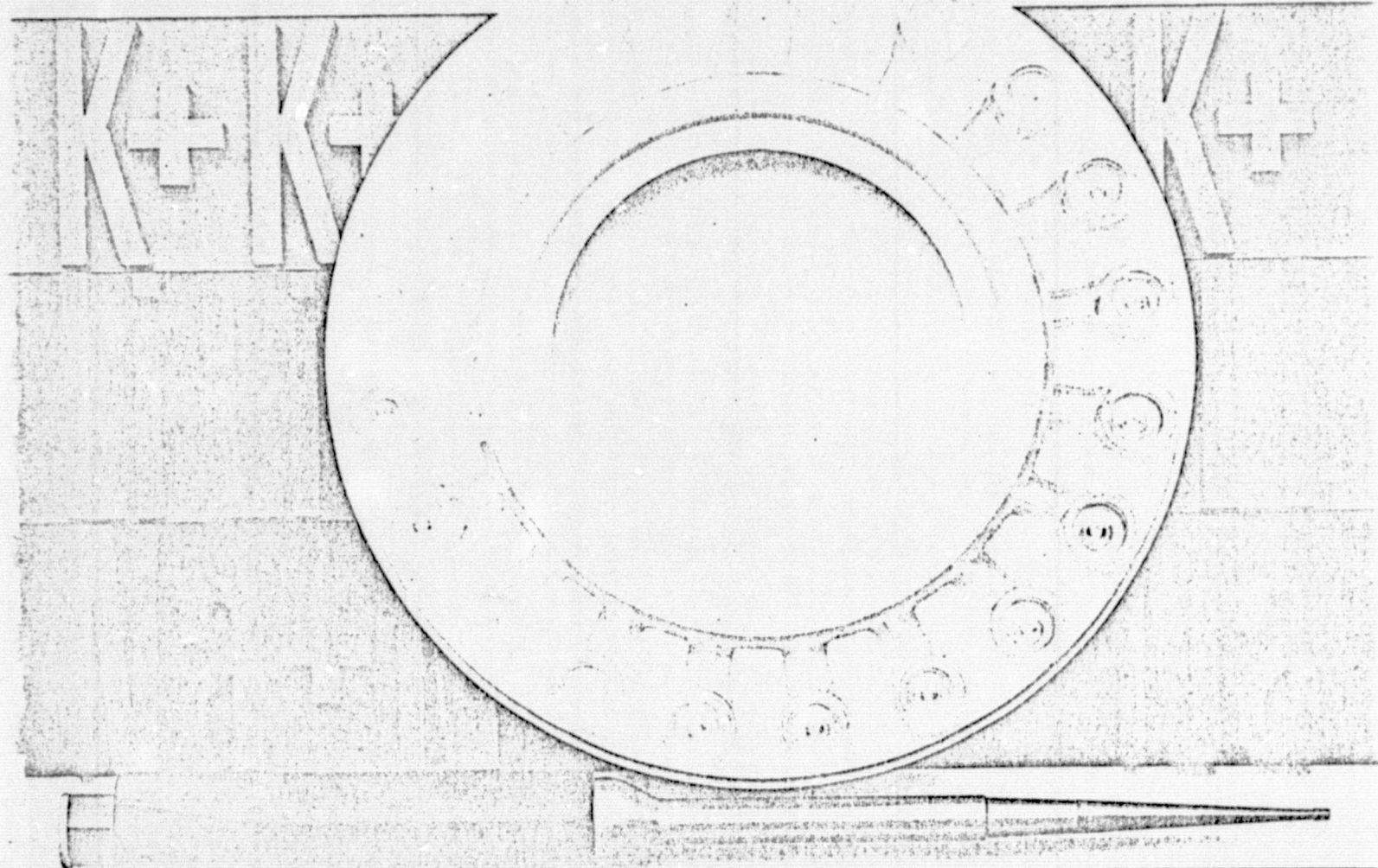
Clinical Instruments Division
Fullerton, California

IIT RESEARCH INSTITUTE

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ELECTROLYTE SYSTEM



CO₂ CO₂ CO₂ CO₂

Beckman Electrolyte System

The simple, economical, and confident way to handle your growing electrolyte requirements.

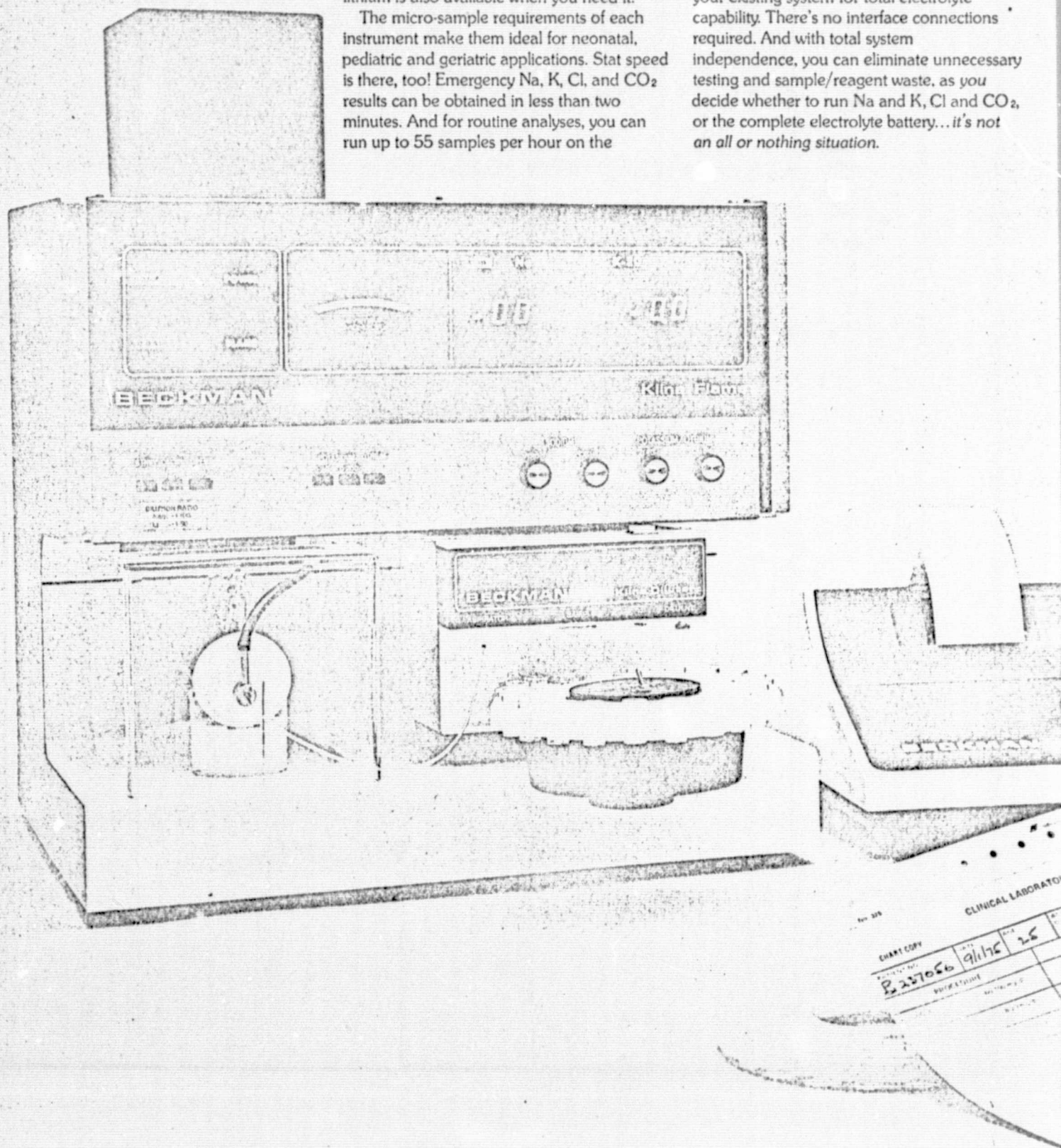
Two specifically dedicated instruments—the new semi-automated Cl/CO₂ Analyzer and the clinically proven, fully automated KLiNa™ Flame System—combine to give you complete electrolyte capability for Na, K, Cl, and CO₂. Four electrolyte determinations, digitally displayed in reportable units, using only 34 µl of your total sample volume. And lithium is also available when you need it.

The micro-sample requirements of each instrument make them ideal for neonatal, pediatric and geriatric applications. Stat speed is there, too! Emergency Na, K, Cl, and CO₂ results can be obtained in less than two minutes. And for routine analyses, you can run up to 55 samples per hour on the

Cl/CO₂ Analyzer, and over 100 samples per hour on the KLiNa Flame System.

These compact, bench-top instruments can be set up rapidly for on-line or backup instrumentation. And you'll perform electrolyte batteries with the speed and ease of fully automated systems (and faster than most), but at a fraction of the cost.

If you already own or lease a KLiNa Flame System...or any flame photometer...you can add the new Cl/CO₂ Analyzer alongside your existing system for total electrolyte capability. There's no interface connections required. And with total system independence, you can eliminate unnecessary testing and sample/reagent waste, as you decide whether to run Na and K, Cl and CO₂, or the complete electrolyte battery...it's not an all or nothing situation.



The modular design of the KLiNa Flame System is another cost savings feature of the Electrolyte System. Add on (from a manual flame system to a fully automated one) as your workload increases, or as your funds permit. And the low cost Cl/CO₂ Analyzer lets you add to your laboratory capability, even on the most limited of budgets.

Whatever your budgetary restrictions, ask your local Beckman Representative about our convenient lease, rental or special purchase plans. They can even tailor a plan to fit your specific needs. Or, our new Reagent/Rental Plan may be the answer...it allows you the use of a complete Electrolyte System on a monthly rental basis, instead of leasing or buying. And service is free...for the entire length of your Reagent/Rental Plan.

As an Electrolyte System Owner or User,

you'll enjoy the benefits of our special customer service programs. Programs that have been developed to make your job a little easier...like our "Hot Line Service" which enables you instantly to contact a team of service or applications specialists when you have a problem or question.

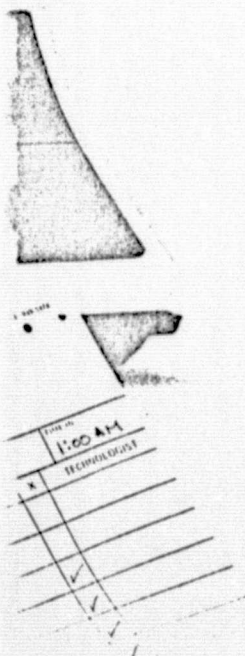
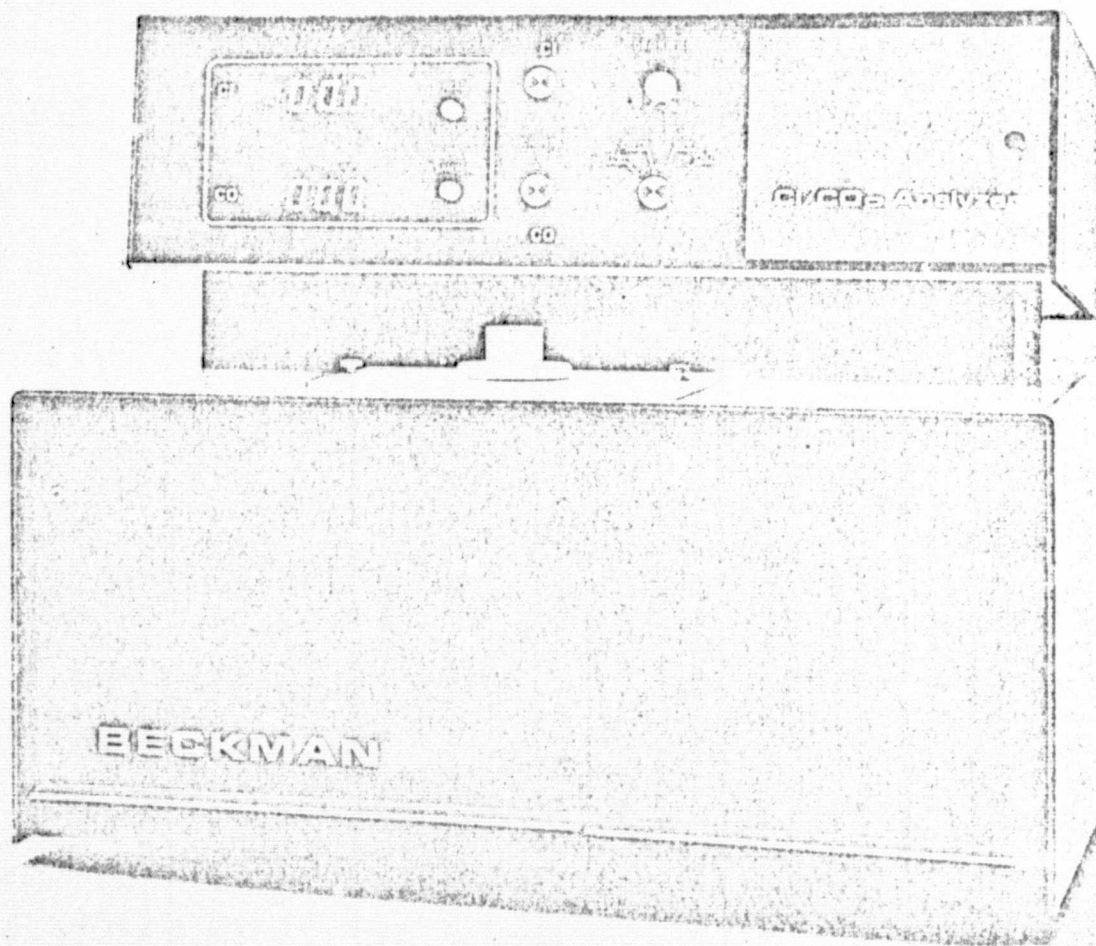
Then there's Essential Supplies Planning, a supplies discount program that gives you a year of supplies at a special discount rate. Rigorous quality control programs assure you of the finest reagents, supplies and expendables available, and Essential Supplies Planning ensures that you receive them when you want them...with as much as a 25% savings on every electrolyte dollar you spend.

And our Preventive Maintenance Programs aid in keeping your new instrumentation in peak operating condition...maintenance that

you perform yourself, to ensure the precision and accuracy of your reportable results.

Seminars are conducted throughout the country that bring you new concepts, skills and applications that can be applied to your laboratory. Beckman also provides a wealth of information to keep you abreast of the constantly changing clinical laboratory scene.

So, whatever your electrolyte requirements, you'll find performing them on the Electrolyte System the simple, economical and confident way.



KLiNaTM Flame System

REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

1 Status Indicators—

Current system status is indicated by means of fail-safe warning lights. These include: Power, Flame, No Gas, and No Air. Should an adverse condition occur (e.g., gas depletion, inadequate air pressure, etc.), the KLiNa Flame flags the condition and shuts itself off automatically.

2 Automatic Lithium Control—

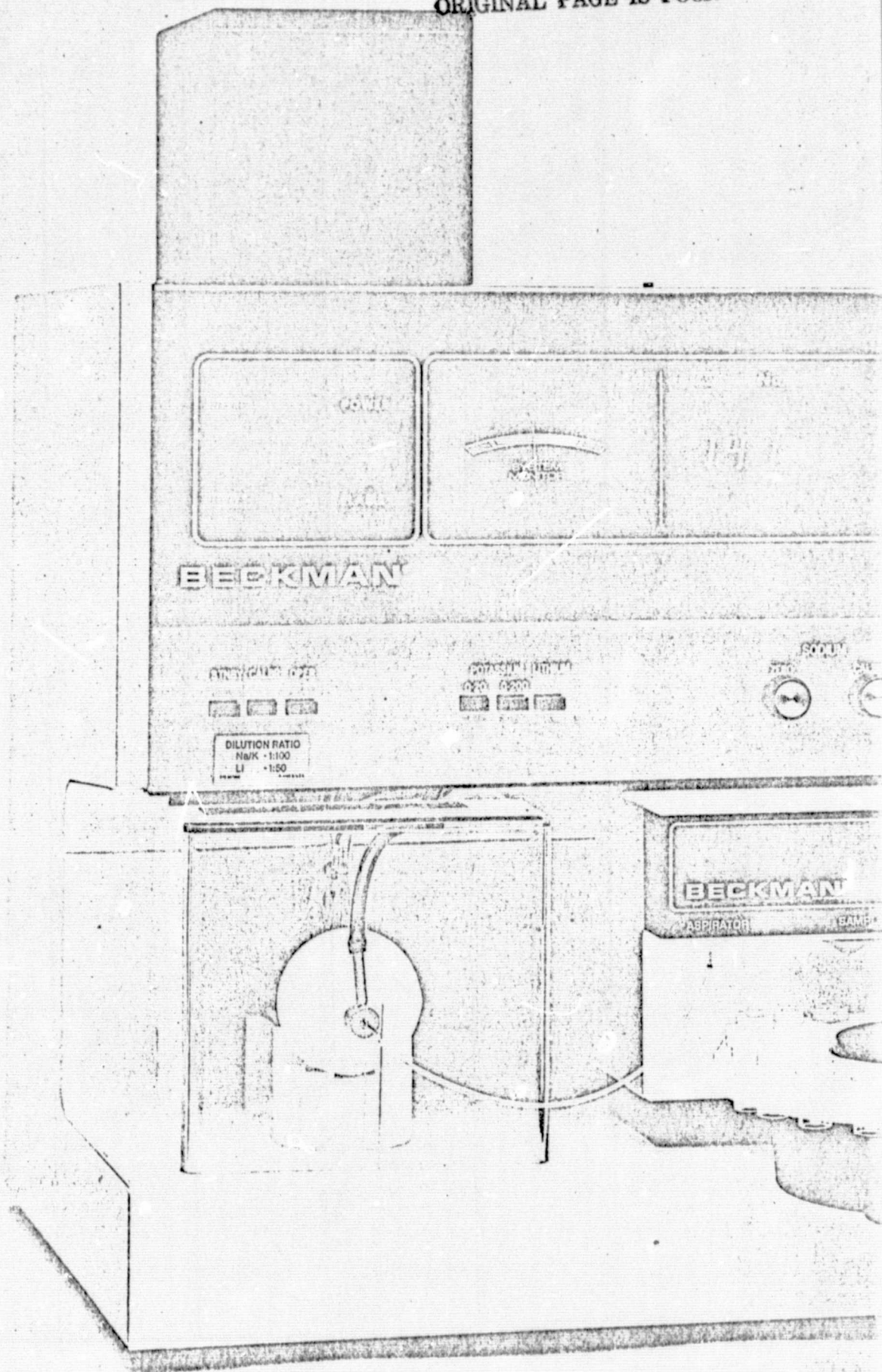
The lithium internal standard is constantly being monitored during flame operation. Any deviations caused by changes in aspiration rate, flame temperature, etc., are automatically adjusted by electronic circuitry. This eliminates manual adjustments, saving you time and ensuring the precision and accuracy you require in your reportable results.

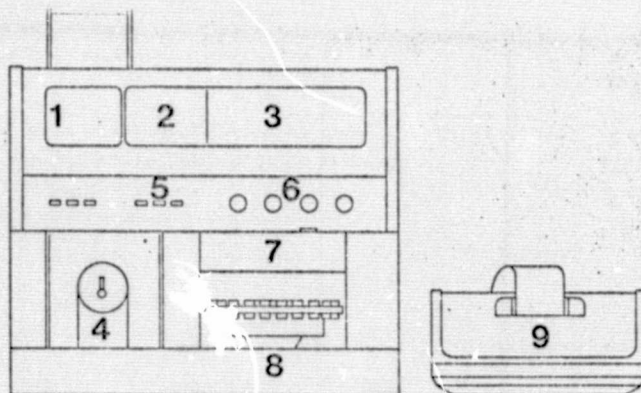
3 Read/Hold Circuitry—

15 seconds after sample introduction, the KLiNa Flame automatically locks and holds your analyzed results. Read and hold circuitry takes the guesswork out of the data transcription by "freezing" the simultaneous display of both Na and K results. The printer then records the results and the system proceeds with the next analysis.

4 Advanced Spray Chamber System—

Preset to eliminate aspirator rate and drain pressure adjustments, the KLiNa Flame aspirator frees you from time-consuming manual adjustments. Clearly visible at all times, the aspirator and spray chamber may be easily removed for routine maintenance when required.





5

Built-In Lithium Capability—

Run lithium as easily as sodium and potassium...and with no additional cost! Simply change internal standard, flush the spray chamber and switch to the lithium mode of operation. That's all there is to it! Both sodium and lithium results will be simultaneously displayed and printed.

6

Photomultiplier Detectors—

For added precision, reliability and a high signal-to-noise ratio, the KLiNa Flame uses three photomultiplier detectors. The exceptional stability of the detectors, and the use of integrated circuits throughout the system, eliminates the need for restandardization every 4 to 5 samples.

7

Positive Displacement Piston

Dilutor—Here's a dilutor that does more than dilute. For example, the KLiNa Dilutor: picks up micro-samples; dilutes with a positive displacement piston-type pump;

stirs sample and diluent in a discrete sample cup; and flushes its own lines, probe and sample cup with diluent between samples...all automatically. The dilutor also gives you a choice of fixed dilution ratios. And with no tubing to stretch or wear out, you'll maintain a high level of precision over a longer period of time.

8

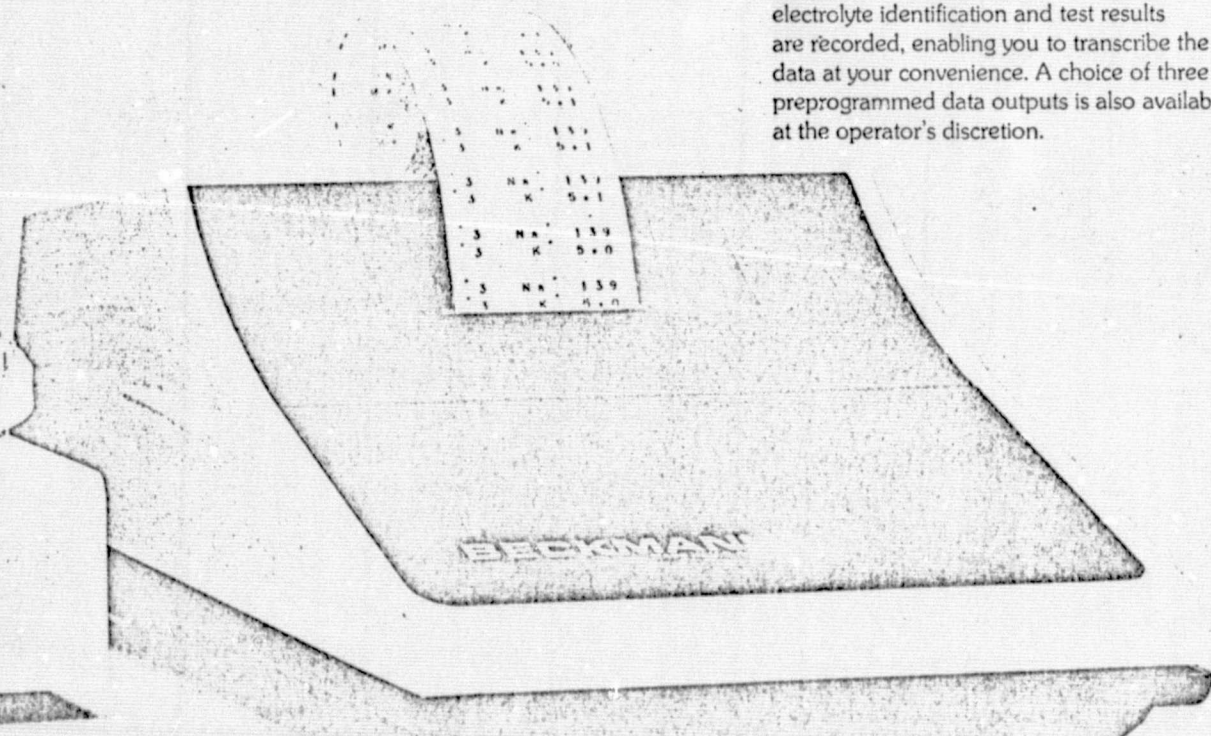
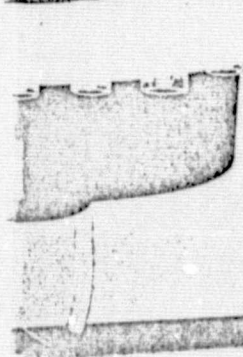
Walk Away Operation—

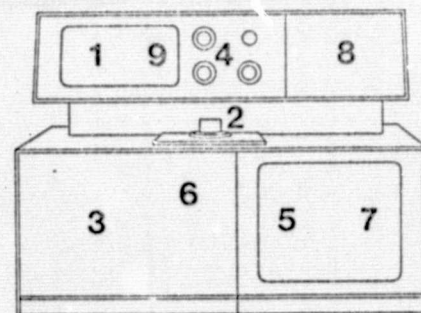
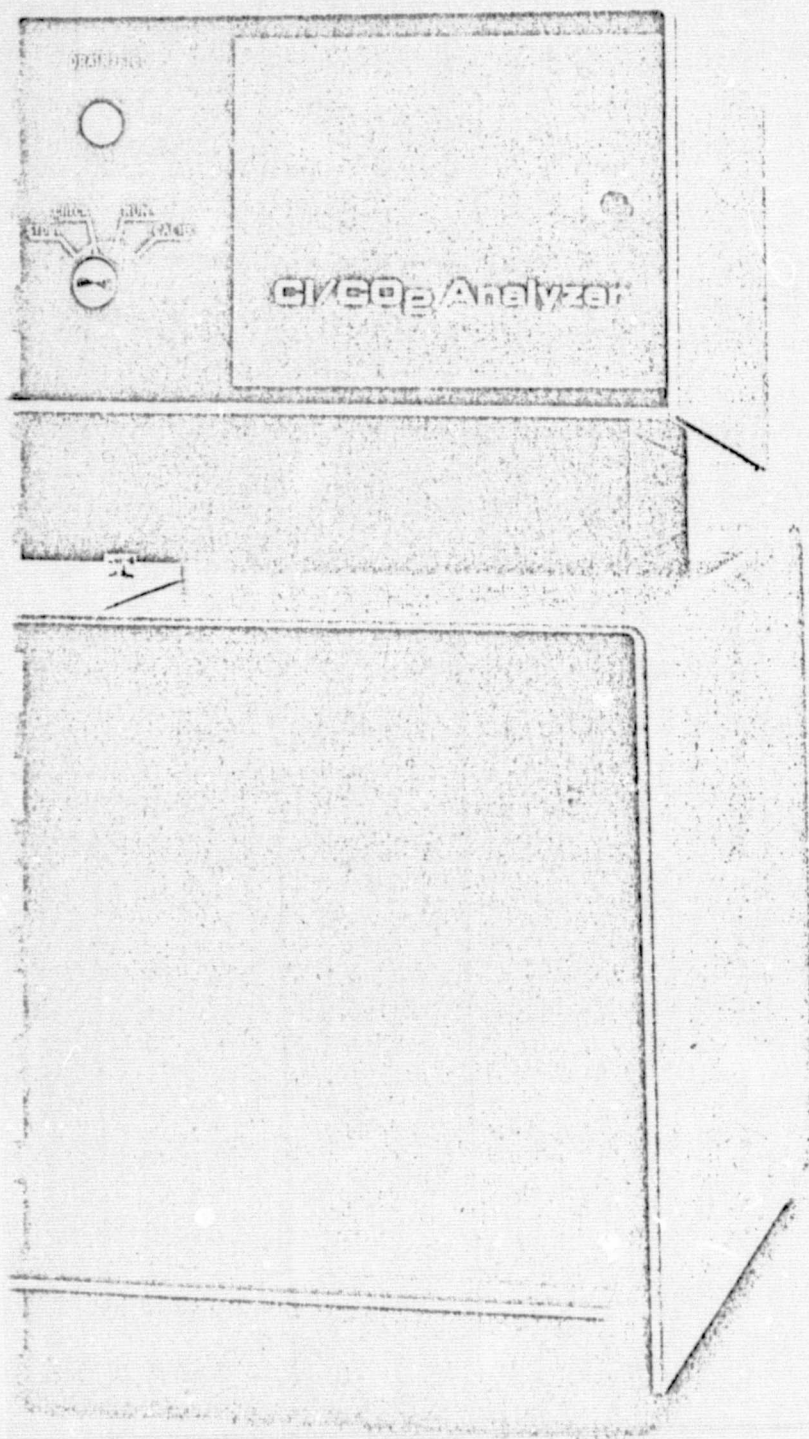
From sample pickup to digitally displayed and printed results, everything is automatic. The system will run up to 20 continuous, discrete samples, on one sample tray...fully unattended. Over 100 samples or 200 results, including restandardization at the recommended interval, per hour. And 24 μ l of your sample is all that's required! Results are accurate and precise, with no inter-operator variations.

9

Printed Results—

When you have other things to do, the KLiNa Printer lets you do them! The sample position, electrolyte identification and test results are recorded, enabling you to transcribe the data at your convenience. A choice of three preprogrammed data outputs is also available at the operator's discretion.





6 Sample Versatility—The unique proportional control of silver ion generation gives you maximum accuracy in the low chloride range. This makes the Cl/CO₂ Analyzer the instrument of choice for analysis of sweet samples, as well as serum, plasma or spinal fluid samples.

7 CO₂ By Rate pH Sensing—Like chloride, the reaction is initiated by pipetting a standard or sample into the same acid solution within the analyzer's reaction cup. All forms of CO₂ in the sample are immediately converted to CO₂ gas. Liberated CO₂ diffuses across a membrane separating the acid from an alkaline buffer solution in contact with a glass pH electrode. The diffusing CO₂ lowers the pH of the alkaline solution bathing the electrode. Measurement of the maximum rate of pH change is proportional to the CO₂ present in the sample.

8 Fault Isolation Capability—Verifies instrument integrity by enabling you to isolate problems, specific to the three main instrument functions...chemistry, electrode, or electronics.

9 Automatic Status Indicators—Lighted indicators guide you through the simple two-step operation of the system, notifying you when to inject the *Sample*, and when to *Read* your results. If the system has been left on standby, or a sample has not been introduced within three minutes, the *Drain/Fill* indicator will light. This alerts the operator that the instrument should be cycled to pump in fresh reagents, thereby assuring the accuracy and precision of your results. Should overrange of either the Chloride or CO₂ channel be encountered, the digital display automatically alerts you to the abnormal condition.

Cl/CO₂ Analyzer

1 Simultaneous Cl and CO₂ Results

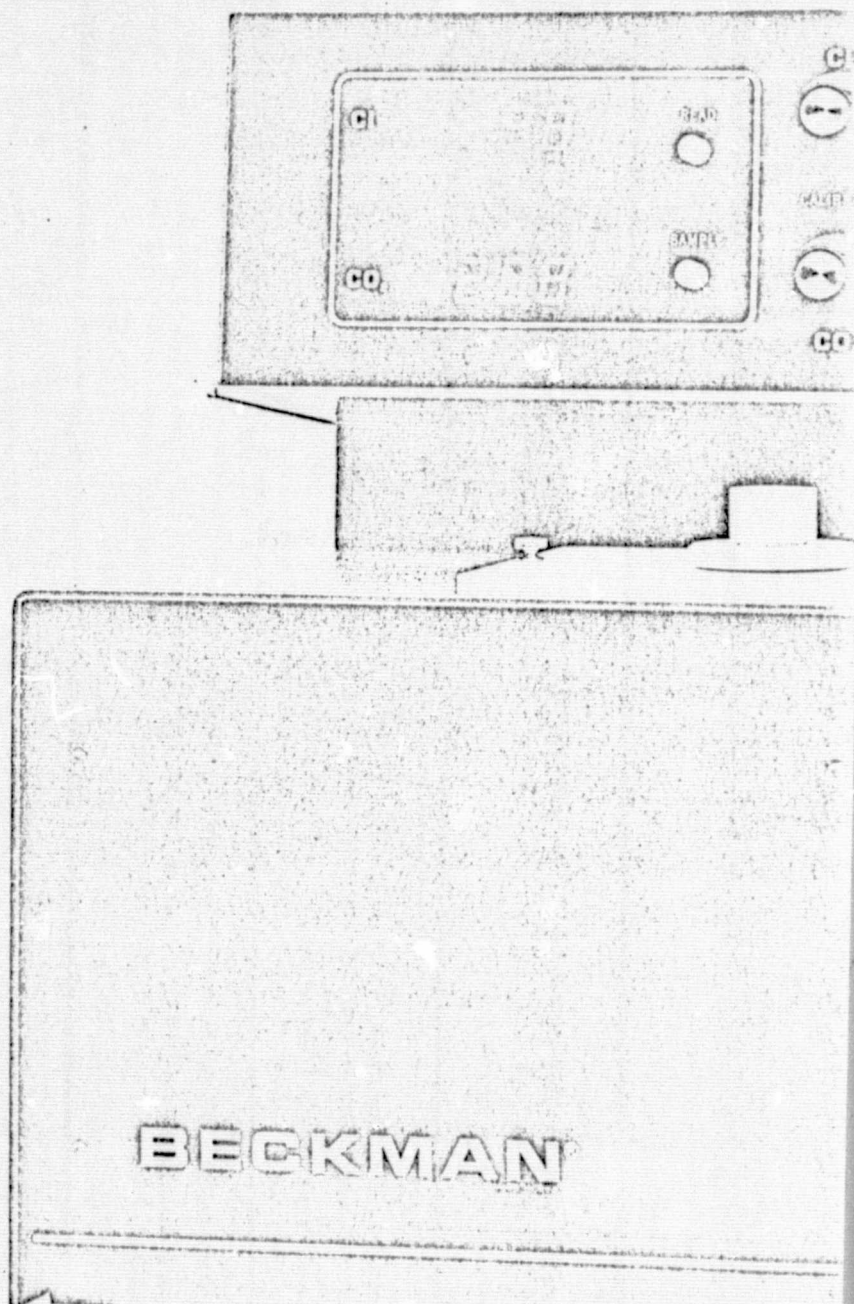
—Within 30 seconds after sample injection, you'll have your reportable results... simultaneously displayed in millimoles/liter. No computations or conversions are required, just a simple notation of the digitally displayed results. And the results of your analysis are locked in, until the next sample is introduced.

2 Micro-Sample Requirements—A single 10 μ l sample of sweat, serum, plasma, or CSF is all that's required. Sample introduction is by means of a highly precise Beckman 10 μ l pipet. And the proven pipetting technique (which requires only a few minutes to learn) is the same as that used on our Glucose and BUN Analyzers.

3 Automatic Reagent Handling—The system automatically drains, rinses and refills the reaction cup with fresh reagents between each sample injection. This eliminates an additional operator step, and further simplifies instrument operation.

4 Ease-Of-Operation—Inject your sample and read your results...it's that simple. Calibration is just as easy and requires only minutes. This means you can have the benefits of fast, accurate chloride—CO₂ answers with a minimum of operator training time.

5 Chloride by Proportional Coulometric Titration—The reaction is initiated by pipetting a standard or sample into the specially formulated acid solution in the analyzer's reaction cup. The method is based upon the titration of the chloride present in the sample, with silver ions generated from a silver anode. The analyzer goes one step further than conventional coulometric titrators, however, in that the rate of generation of silver ions is proportional to the changing chloride concentration. This guarantees an accurate endpoint, sample after sample.



Specifications

Cl/CO₂ Analyzer

Sample Volume:	10 μ l
Reagent Volume:	Cl/CO ₂ reagent - 2.2 ml Alkaline reagent - 1.1 ml
Throughput:	55 Samples Per Hour.
Ambient Temperature Range:	18-32° C
Read Time:	30 Seconds after sample injection, nominal
Readout:	Digital Display in millimoles/liter
Measurement Principles:	Chloride - by proportional coulometric titration CO ₂ - by rate pH sensing
Power Requirements:	115/240 volts a.c., 50/60 Hz.
Shipping Weight:	50 lbs. (22.6 Kg)
Dimensions:	Height - 15 $\frac{1}{4}$ " (40.0cm) Width - 18" (46.0cm) Depth - 16 $\frac{1}{2}$ " (42.0cm)

International Subsidiaries:

Amsterdam; Capetown; Geneva; Glenrothes, Scotland; London; Mexico City; Munich; Paris; Stockholm; Tokyo; Vienna.

Shipping Instructions

Many chemicals and other products must be shipped under restrictions placed by the Food and Drug Administration, Department of Transportation, International Air Transport Association, the United States Postal Service, or other organizations. Consequently, our method of shipment is often governed by these associations and agencies. In these instances, we reserve the right to ship by alternative methods from those requested, in order to comply with established regulations.

KLiNa Flame System

Sample Volume:	24 μ l, Na + K 48 μ l, Na + Li
Aspiration Rate:	Typically 2.5 $\pm$ 0.5 ml/min. of diluted sample
Response Time:	6 seconds
Fuel: (Operating Pressure)	80-120 psig.
Air: (Operating Pressure)	35-60 psig., regulated to instrument
Throughput:	120 samples per hour
Readout:	Simultaneous Na, K or Na, Li - digitally displayed in millimoles/liter
Stability:	$\pm$ 1% of fullscale per hour
Dilutor Ratios:	200:1, 100:1, and 50:1
Power Requirements:	120/240 volts a.c., 50/60 Hz.
Sample Capacity:	1 to 20 continuous samples. On/Off switch for repetitive sampling in any position.
Dimensions:	Height - 21 $\frac{1}{4}$ " (53.9cm) Width - 17 $\frac{1}{8}$ " (44.7cm) Depth - 16" (40.6cm)
Shipping Weight:	87 lbs. (39.4 Kg)

Reagent/Rental Program

Ask your local Beckman Representative about our convenient Electrolyte System - Reagent/Rental Plan, and how it works. He'll show you how to obtain a complete Cl/CO₂ Analyzer and KLiNa Flame System... plus reagents and supplies... on a low monthly charge. Or, for complete details, write to: Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, CA 92634, Attention: Dept. 962*.

*All Purchase Plans, Hot Line Service, Preventive Maintenance Programs and Seminars as described herein, are for the United States and Canada. For programs applicable to your specific area, contact your Beckman Representative.

CLINICAL LABORATORIES INC.

CHART COPY

PATIENT NO.	DATE	AGE	ADMIT. DIAG.	TIME IN
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PROCEDURE	RESULT	X	TECHNOLOGIST	
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BECKMAN®

Beckman Instruments, Inc.
Clinical Instruments Division
2500 Harbor Boulevard
Fullerton, California 92634

May 1, 1976

BECKMAN®**ELECTROLYTE SYSTEM****Cl/CO₂ ANALYZER**

PART NUMBER	DESCRIPTION	PRICE
Cl/CO₂ ANALYZER		
661600	Consists of: Analyzer, Complete Supply Kit including micropipet, chloride/CO ₂ and alkaline reagent, calibration standard, electrode cleaner, and 500 disposable pipet tips plus maintenance kit.....	\$6,400.00
TEST KITS		
661850	Cl/CO ₂ Reagent Kit. Includes 5-250 ml bottles of Cl/CO ₂ reagent, 5-125 ml bottles of alkaline reagent, 1-50 ml bottle of 100 mM/l chloride and 30.0 mM/l CO ₂ combination aqueous standard, plus 1-6 ml tube of electrode cleaner. Reagent enough for approximately 500 tests.....	58.00
661860	Cl/CO ₂ Supply Kit. Includes 5-250 ml bottles of Cl/CO ₂ reagent, 5-125 ml bottles of alkaline reagent, 1-50 ml bottle of 100 mM/l chloride and 30.0 mM/l CO ₂ combination aqueous standard, 1-6 ml tube of electrode cleaner, plus 500 disposable pipet tips. Reagent enough for approximately 500 tests.....	75.00
661820	Cl/CO ₂ Linearity Kit. Contains 5 ampules 1 ml each of 100/30.0 aqueous standard, 5 ampules 1 ml each of 125/20.0 aqueous standard, 5 ampules 1 ml each of 75/40.0 aqueous standard. All traceable to NBS standard reference material.....	30.00
661830	Sweat Standard Kit. Contains 15 ampules 1 ml each of 30 mM/l chloride aqueous standard. Traceable to NBS standard reference material.....	20.00
659155	Beckman Control Serum-Normal.....	27.35
659125	Beckman Control Serum-Abnormal.....	27.35
659145	Beckman CO ₂ Diluent-Normal.....	1.30
SUPPLIES/REPLACEMENT ITEMS		
671399	Pipet (10 μ l).....	78.00
651576	Pipet Tips, disposable (Box of 1,000).....	34.50
879049	Lubricant, syringe (2 oz. tube).....	5.00
661817	Calibrator, aqueous standard (100 mM chloride/30.0 mM CO ₂ ml bottle).....	5.00
661840	Chloride Electrode Cleaner, 1-3 ml tube.....	3.00
815473	O-Ring, Cup (large).....	.25
011167	O-Ring, Cup (small).....	.30
661631	Anode, silver.....	10.00
661750	Membranes, CO ₂ electrode (Package of 5).....	6.00
661618	Membrane retainer, CO ₂ electrode (Package of 2).....	4.00
011519	O-Ring, chloride electrode.....	.30
042550	O-Ring, CO ₂ electrode.....	.30
671642	Tool, Stirrer removal.....	11.50
651683	Stirrer, cup.....	14.50
661620	Electrode, pH.....	88.00
661630	Electrode Assembly, chloride.....	49.60
874406	Lamp, drain/fill (Package of 4).....	9.00
853354	Lamp, read.....	1.10
661738	Syringe, 1½ cc, reworked.....	11.00
661737	Syringe, 5 cc, reworked.....	11.00
661736	Syringe, 3 cc, reworked.....	11.00
661732	Tubing, alkaline reagent bottle feed line.....	3.00
560480	Tubing, Cl/CO ₂ reagent bottle feed line.....	4.90
661730	Tubing, drain line.....	4.00
661655	Test Board.....	30.00
661638	Reaction cup, complete.....	144.00
661762	Reaction cup, base.....	50.00
813184	Line cord, replacement.....	10.00
083633	Operator's manual.....	20.00
023620	Screwdriver, syringe removal.....	3.00

THE BECKMAN KLiNa™ FLAME SYSTEM

PART NUMBER	DESCRIPTION	PRICE
652710	KLiNa Flame System (Fully Automatic)..... Consists of: KLiNa Flame (652709), KLiNa Dilutor, KLiNa Changer, KLiNa Printer and KLiNa	\$7595.00

NUMBER	DESCRIPTION	PRICE
652610	KLiNa Flame System (Semi-Automatic) Consists of: KLiNa Flame, KLiNa Dilutor, KLiNa Changer and KLiNa Care Kit.*	5230.00
652510	KLiNa Flame System (Semi-Automatic) Consists of: KLiNa Flame, KLiNa Dilutor and KLiNa Care Kit.*	4880.00
652210	KLiNa Flame (Manual)..... Consists of: KLiNa Flame and KLiNa Care Kit.*	4190.00

*KLiNa Care Kit contains complete start-up supplies including Lithium concentrate, serum and urine calibration standards, Instruction Manual & a Maintenance and Trouble Shooting Manual. These units do not include air compressor or propane fuel. Laboratory must provide clean, dry air regulated to a minimum of 40 psig. We recommend 663230 Compressor or 652531 Regulator. Please include propane fuel with the initial order.

KLiNa FLAME SYSTEM ACCESSORIES

652406	KLiNa Dilutor..... Eliminates time-consuming manual dilution. Highly precise positive piston displacement action. You select one of three fixed dilution ratios. Plugs directly into KLiNa Flame Photometer.	1195.00
652405	KLiNa Changer..... Reduce sample handling with this totally new sample turntable. Up to 20 samples can be run semi-automatically. Plugs directly into KLiNa Dilutor.	350.00
652800	KLiNa Printer/Interface Kit..... Achieve complete walk-away flame operation by adding the KLiNa Printer/Interface Kit to a semi-automatic flame system. Offers a permanent paper tape record of analyses with sample identification. Interfaces with KLiNa Flame and KLiNa Dilutor.	2365.00
667100	KLiNa Printer.....	1495.00
663230	Air Compressor 115V, 60 Hz. Complete with filter and regulator assembly.....	295.00
652531	Air Regulator Kit. Complete with regulator, gauge and filter for use with laboratory air lines (lines must have a minimum of 50 psig).....	150.00
658791	KLiNa Protective Shield (For SN 1071 and above, use 663384 for SN 1070 and below)..... Covers spray chamber and is recommended for use in installations using laboratory air lines.	20.00

KLiNa FLAME SYSTEM SUPPLIES

659155	Beckman Control Serum-Normal.....	27.35
659125	Beckman Control Serum-Abnormal.....	27.35
663226	KLiNa Flame Urine Standard, 100 mmol Na/l, 100 mmol K/l—100 ml.....	4.25
663225	KLiNa Flame Serum Standard, 120 mmol Na/l, 2 mmol K/l—100 ml.....	4.25
663223	KLiNa Flame Serum Standard, 140 mmol Na/l, 5 mmol K/l—100 ml.....	4.25
663224	KLiNa Flame Serum Standard, 160 mmol Na/l, 8 mmol K/l—100 ml.....	4.25
663229	KLiNa Flame Lithium Concentrate, 150 mmol Li/l—500 ml.....	4.70
663228	KLiNa Flame Potassium Concentrate, 40 mmol K/l—500 ml.....	4.70
663390	KLiNa Flame Lithium Standard, 2 mmol Li/l—100 ml.....	4.25
105608	KLiNa Fuel, instrument-grade propane fuel. Case of 12, 14.1 oz. disposable cylinders.....	58.00
652730	Sample cups, disposable, 2.0 ml size (box of 1,000).....	13.60
652350	Propane Gas Valve.....	15.00
671546	KLiNa Changer Sample Tray.....	19.95
651441	Sample Tray Cover.....	7.95
651432	KLiNa Printer Paper Tape (Package of 5 Rolls).....	6.00
663299	Spray Chamber.....	50.00
652261	Chimney.....	10.00
009111	Aspirator Cleaning Wires (5).....	2.30
652158	Burner Screen.....	2.30
865284	Printer Ribbon (For 667050 and 654055 Printer).....	5.50
879159	Printer Ribbon (For 667100 Printer).....	5.50
652667	Sample Cup Holders for KLiNa Changer (Package of 5).....	6.00
656420	Dilutor Tip Change Kit.....	28.50
651497	Dilutor Mixing Cups (5).....	10.95
083986	Log Book.....	7.00

ESSENTIAL SUPPLIES PLANNING CAN SAVE YOU AS MUCH AS 20 ON YOUR SUPPLIES PURCHASES!

Essential Supplies planning is an annual supplies ordering system that can save you money on each supplies purchase, reduce your supplies ordering paperwork and cut down on your inventory space requirements. You dictate the supplies shipping schedule and ESP ensures your supplies arrive at your doorstep when you need them. ESP also protects you against any price increases for up to one year, yet guarantees you receive the benefit of any price reductions that may occur during your ESP term. Ask your Beckman representative how ESP can cut your costs, your paperwork and offer you price protection at the same time.

WARRANTY AND TERMS

All equipment is warranted against defects in material and workmanship for a period of one year following delivery. Net 30 days. Price subject to change without notice.

REAGENT/RENTAL PROGRAMS NOW AVAILABLE

Ask your Beckman representative about this unusual, limited commitment program that gives you the use of a complete Beckman instrumentation package in your laboratory on a low monthly charge based on your sample volume. Reagent/Rental Programs are currently available on Microzone electrophoresis systems, System TR Enzyme Activity Analyzer, the KLiNa Flame Photometer, Chloride/CO₂ Analyzer, the Glucose, BUN, and System I Glucose/BUN Analyzers.

A choice of five different leasing and rental plans are also available from Beckman. Review them with your local representative and choose the plan that fits your financial needs.

BECKMAN®

Beckman Instruments, Inc.
Clinical Instruments Division
2500 Harbor Boulevard
Fullerton, California 92634

TECHNICON INSTRUMENTS CORPORATION

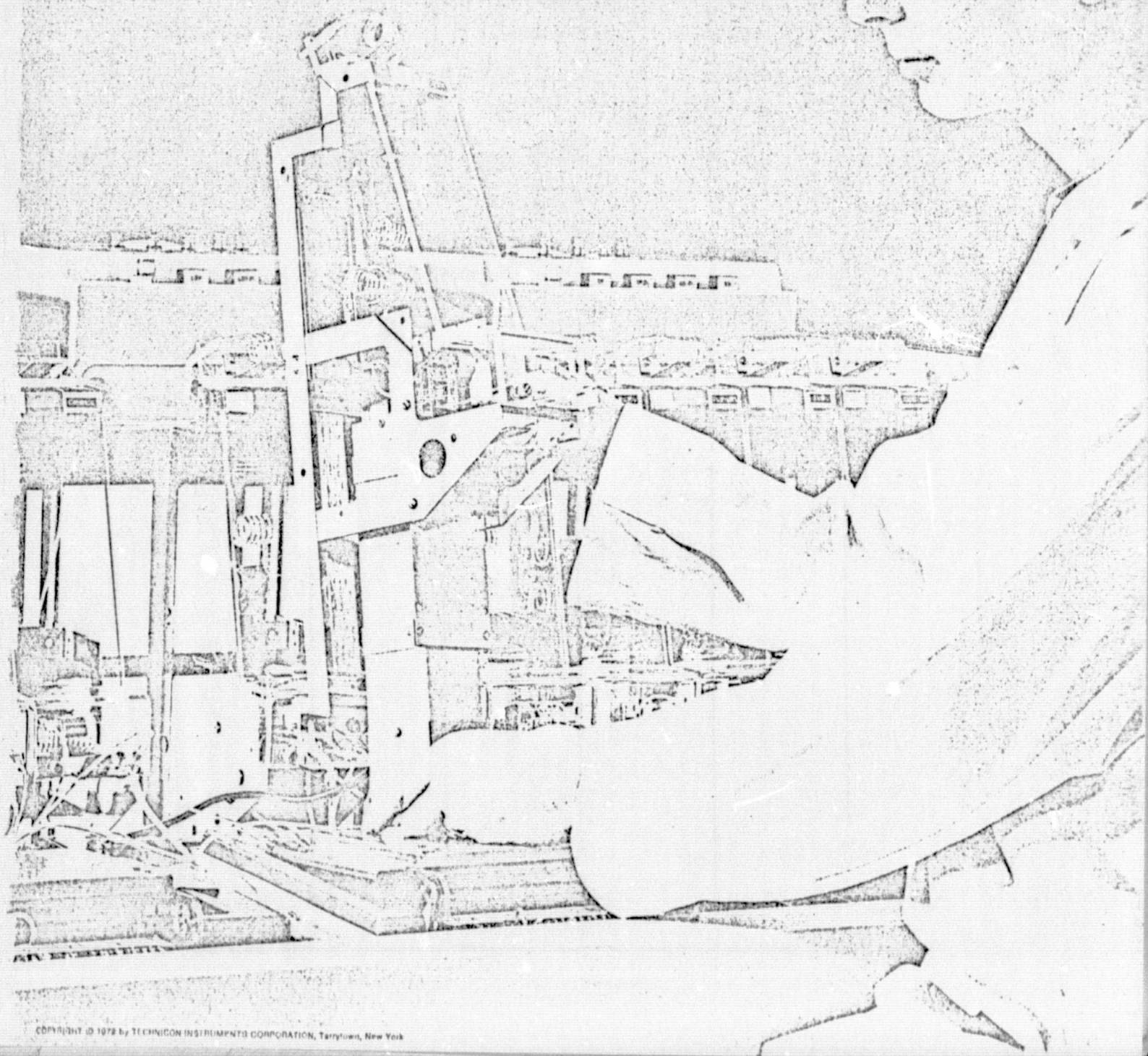
Tarrytown, New York

IIT RESEARCH INSTITUTE

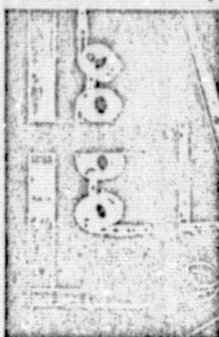
SMA 12/60

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The SYMA 100 is a highly sophisticated, portable, and accurate instrument for measuring the thickness of materials. It is designed for use in a wide range of applications, from the inspection of thin films to the measurement of the thickness of structural components. The SYMA 100 is a non-destructive, non-contact instrument that provides accurate measurements in a matter of seconds. It is easy to use and requires no special training. The SYMA 100 is a valuable tool for anyone who needs to measure the thickness of materials accurately and quickly.



SMA 12/60



Cover art is an illuminated close-up of coils in an analytical cartridge

Introduction

Medical practice today demands instrumentation that is fast, accurate, and capable of producing a wide range of clinical data. Experience proves that the best way—if not the only way—for the modern clinical laboratory to cope with this varied workload is through routine, total, biochemical profiling. It is not only more economical to subject every biological sample to a battery of tests—rather than the two or three most urgently indicated—but this “unsolicited laboratory information” yields a bonus of incalculable benefit to doctor, patient, and community.

The SMA 12/60 System has revolutionized laboratory practice by demonstrating the value of obtaining such information through biochemical profiling. In a large number of cases, profiling makes possible an early detection of unsuspected pathology which effects changes in diagnosis.

It is in this light that the advantages of Continuous Flow Analysis and accurate recording of results at steady-state levels, embodied in all Technicon® AutoAnalyzer® Systems, must be viewed. Brought to its most refined form in the SMA® Systems, Continuous Flow Analysis has proven itself through more than fifteen years of superior laboratory performance all over the world.

The SMA 12/60 is now the system of choice for daily clinical workloads, routine chemistry profiling of all hospital admissions, and health evaluation programs.

Applications

Daily clinical workloads ... become routine procedures with the SMA 12/60. Ninety percent or more of the total clinical chemistry workload can be performed on one SMA 12/60. As a result, 90% of the samples received are immediately fed into the system without time-consuming, error-prone, sample sorting. There is no need for multiple venipunctures... Results are immediately available without transcribing or collating... All lab specimens are handled in the same way, effecting important economies in time and labor, while improving the overall quality of the results.

Routine admission “Profiles” ... make complete information available to the physician when he first sees the patient in the hospital. In addition to serving as confirming or negating evidence of the suspected disease, the Serum Chemistry Graph serves as a baseline against which to measure future metabolic changes. Moreover, it has been the experience at various institutions that the patient at the time of admission is usually in a superior state for meaningful biochemical profiling than he is after being hospitalized and subjected to various drugs.

For the most complete profile, the ideal system is now the SMA® 18/60, which interfaces an SMA 12/60 System with an SMA® 6/60 system. Operating at the rate of 60 samples per hour from a common sampler, the SMA 18/60 provides broad-spectrum profiling economically, by further decreasing the handling and sorting of samples, and standardizing the laboratory procedure to its maximum efficiency. Further details on this system are given at the back of this brochure.

Multiphasic health evaluation ... can only be performed effectively by instrumentation capable of handling large numbers of samples for a variety of significant parameters. The ability to choose the procedures to be performed by the SMA 12/60 makes it invaluable to members of the medical community responsible for the wide range of evaluatory programs currently underway.

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Test Flexibility

To meet your requirements, your SMA 12/60 is custom designed to provide any twelve (plus blank channels where applicable) of the following biochemical procedures:

SGPT (including blank)	SGOT	Potassium
Alkaline Phosphatase		Chloride
LDH (including blank)		Carbon Dioxide
Fractionated LDH		Calcium
(including blank)		Inorganic Phosphate
Total Bilirubin		Total Protein
(including blank)		(including blank)
Direct Bilirubin		Albumin
(Avail. only with		(including blank)
Total Bilirubin)		CPK
Uric Acid		Glucose
Urea Nitrogen		Cholesterol
Sodium		Creatinine
		Serum Iron

Separation of chemistries by means of "Plug-in" analytical cartridges

Each of the chemistries on the SMA 12/60 is performed in an individual, compact, "plug-in" analytical cartridge. Each cartridge as supplied by Technicon is a complete unit containing all the hardware needed for one specific procedure: mixing coils, phasing coils, dialyzer, heating units if needed, and all requisite connections. There are no internal connections to be made.

Speed

SMA 12/60 produces serum chemistry graphs at the rate of 60 per hour, or an effective analytical rate of 54 per hour (plus six standards). This amounts to a maximum of 432 twelve-test profiles, or 5184 chemical tests in an eight-hour working day. The time from aspiration of a given sample to finished chart is only 8½ minutes—less time than it takes to complete any one of these tests by other methods.

Reporting of Results

The results of the twelve tests for each sample are reported in concentration units on the recorder's Serum Chemistry Graph and on the Digital Report Form. The Technicon IDec number for each sample is automatically printed on each of these forms. Since the normal ranges for each parameter are pre-printed on both forms, the physician does not have to remember the normal values.

With the time interval between drawing blood and recording results drastically decreased, the usefulness of the analytical data is greatly increased. With no sorting, calculation, transcription, or collation required, the results are immediately ready for transmittal to the requesting physician for evaluation

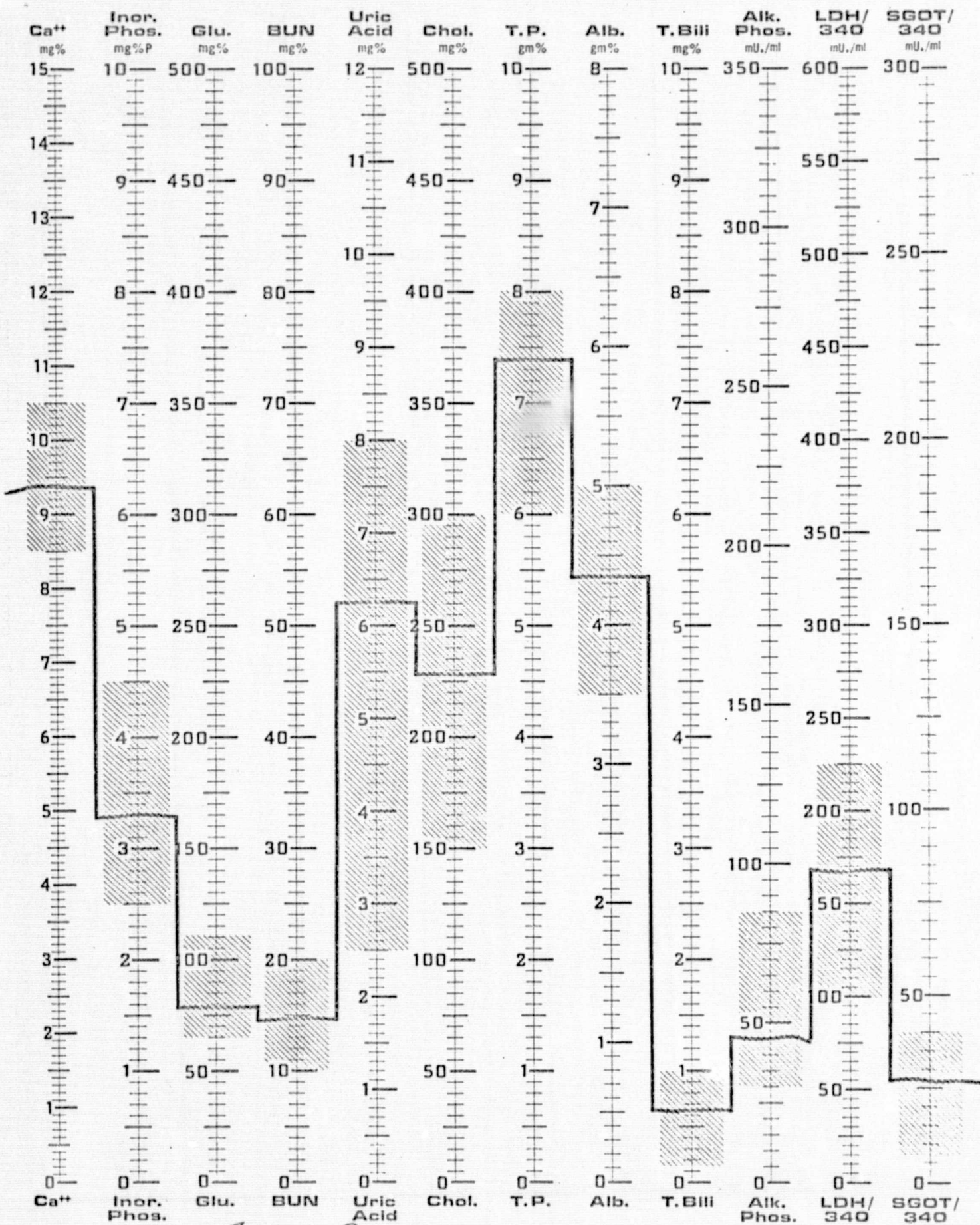
and placement in the patient's file. There is no need to hold up the report till the end of the day while other, slower tests are being completed. Diagnosis can often be made before a laboratory using other procedures delivers its report.

Data Converter

In addition to printing out the digital results of all tests on convenient Digital Report Forms, the Data Converter module also prints out the Technicon IDec number and a "Hi" or "Lo" warning next to any abnormal results. The normal and abnormal limits can be modified at the user's discretion. The sequence number and date are also automatically printed on the Form, which is preprinted with the normal values for each test. If any of the 12 tests is not required, it can be "dialed out" by use of the by-pass switches to prevent its reading from appearing on the Form. By connecting the Data Converter to a Model 33 Teletypewriter, the system can print out in a horizontal format, or prepare a paper tape record of all results. Both of these printouts can be transmitted to the computer of a laboratory information system for on-line processing of results.

TECHNICON® DATA CONVERTER		
TEST	CONC.	UNITS
SGOT/340	27	7-40 mU/ml
LDH	170	100-225 mU/ml
Alk. Phos.	45	30-85 mU/ml
T. Bill.	0.7	0.15-1.0 mg%
Alb.	4.4	3.5-5.0 gm%
T.P.	7.4	6.0-8.0 gm%
Chol.	228	150-300 mg%
Uric Acid	6.3	2.5-8.0 mg%
BUN	12	10-20 mg%
Glu.	79	65-110 mg%
Inor. Phos.	3.3	2.5-4.5 mg%P
Ca ++	9.4	8.5-10.5 mg%
100245	IDec NO.	DOCTOR J. Brown
172	SEQ NO.	MO DAY 04 12
NAME John Doe		
ADM. LOC 1834		
REMARKS:		

SMA 12/60



Patient's Name

No. 100245

Toluw Doe

Rm.

1834

Date

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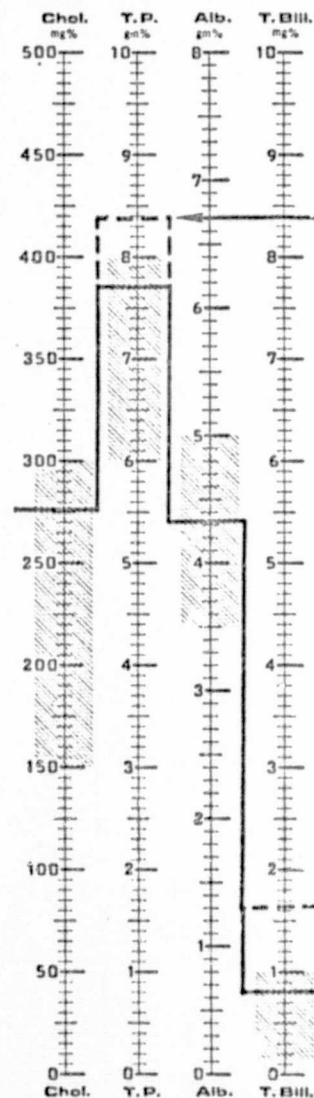
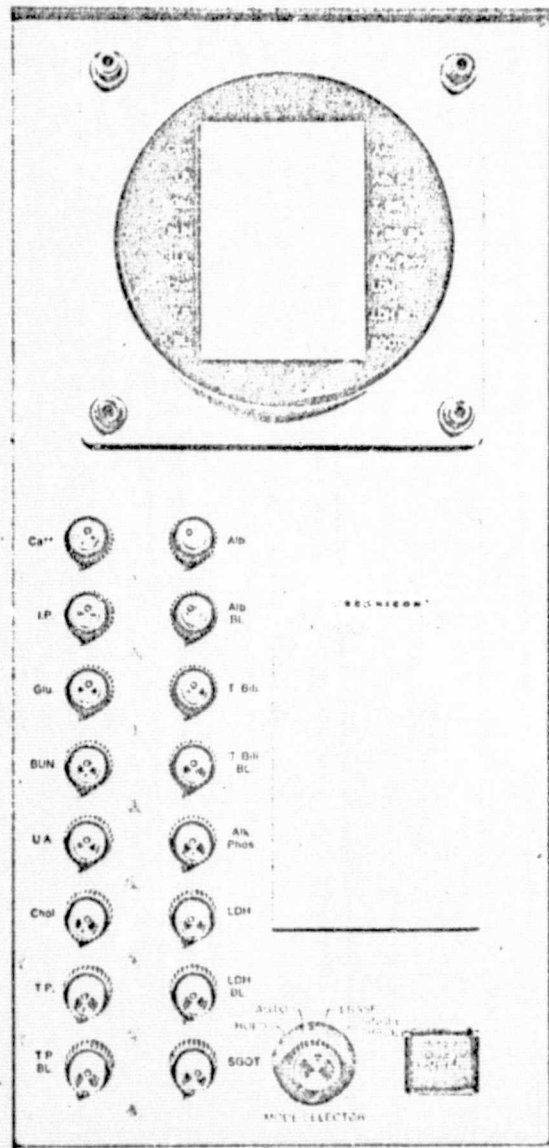
Accuracy

Monitoring system performance

In continuous flow analysis, the color intensity of the air segmented analytical stream(s) is continuously measured in a Colorimeter, and, at the same time, continuously recorded on a strip chart record. One has, at all times, written, continuous recordings of system function—in contrast to a mere number on a piece of paper. On the SMA 12/60, in addition to the primary recording on the Serum Chemistry Graph (SCG), the complete analytical curve for each of the twelve to sixteen channels is visually displayed on a Function Monitor. Thus, one has, at all times, a visual display of machine function.

Automatic Blank Correction

Four blank correction channels are possible with the SMA 12/60 System for use with those test procedures which require them. Tests that do not require blank channels use dialysis to eliminate the necessity for a separate blank channel. The blank values for Total Protein, Albumin, LDH, SGPT, and Total Bilirubin are automatically subtracted from the assay values and only the corrected value is charted. Lipemic or icteric sera no longer pose a problem for accurate biochemical analyses. Automatic blank correction combined with dialysis make Technicon SMA systems the only instruments capable of fully eliminating the effects of non-specific chromogens on test results.



As an example of what could occur, in this sample the values for Total Protein and Bilirubin have been affected by a blank value (see dotted line) due to some factor such as icterus or lipemia. However, as a result of automatic blank correction, the true values for the affected channels have been accurately recorded.

Specifications

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Measured parameters:

	Guaranteed minimum ranges	Repeat-ability	Accuracy (absolute)
pH	6.300 to 8.000	± 0.003	± 0.008
Pco ₂ mmHg	5.0 to 150.0	$\pm 1\%$ of reading	$\pm 2\%$ of reading
Po ₂ mmHg	0.0 to 800.0	$\pm 1\%$ of reading	$10 < P_{O_2} \leq 150: \pm 1.5$
Hb g%	0.0 to 30.0	± 1.0	± 2.0
Barometer B mmHg	500 to 800	± 2	± 4

Derived parameters:

HCO ₃	Plasma Bicarbonate (Actual Bicarbonate)
TCO ₂	Total CO ₂
BE	Base Excess
SBE	Standard Base Excess (Extracellular Base Excess)
SBC	Standard Bicarbonate
These parameters are calculated with an accuracy equivalent to the accuracy of the Siggaard-Andersen Curve Nomogram.	
SAT	Oxygen Saturation
is calculated using the Hills equation corrected for pH with a Bohr factor of 0.48 and with P ₅₀ fixed to 26.6 mm Hg.	

Sample Volume	< 500 µl
Sample handling time	approx. 3 min from the flap is closed to print-out.
Samples per hour	Max. 14
Warming-up and buffer-conditioning period	2 hours from cold condition
Automatic recalibration:	2 hours from cold condition
Time interval	2 hours
Calibration time	6 minutes. May be interrupted for sample measurement.
Measuring Temperature	$37.0 \pm 0.1^\circ\text{C}$
Ambient Temperature	
without external cooling	+ 12 to + 30°C
with external water cooling	up to + 35°C
Thermostating medium	Air
Identification numbers	1-9999
Power	110/220 V (95 - 130/190 - 260 V) 50 or 60 Hz $\pm 5\%$ (please specify), 235 VA
CO ₂ -consumption	One 2.5 litre bottle per 2 months
Cal. sol. consumption	1 bottle (0.5 l) of each per 10 days
NaCl consumption	1 ¹⁾ bottle (0.5 l) per week
KCl consumption	1 ¹⁾ bottle (100 ml) per week
Dimensions	Width: 730 mm Height: 370 mm Depth: 350 mm
Weight	35 kg

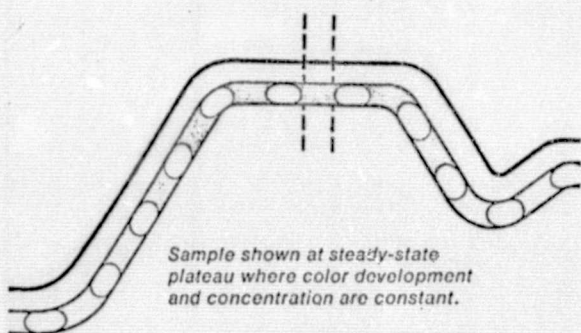
¹⁾ Typical value. Dependent on number of samples per day.

Data subject to change without notice.

US PAT. NO. 3,464,434

US AND OTHER PATENTS PENDING



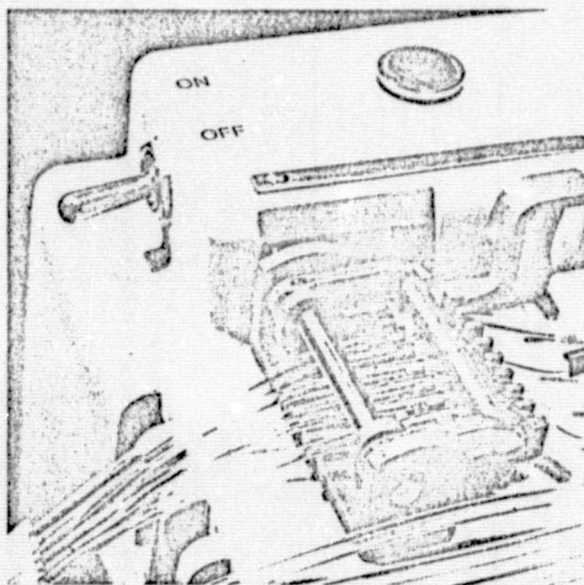


Recording at steady-state levels assures accuracy

Actual measurements are made only after the analytical curve reaches its steady-state plateau (which may be defined as an equilibrium condition in the system at which there are no changes in concentration with time). *At this steady-state plateau, all effects of possible sample interaction have been eliminated, and the recorded signal gives a true reflection of the concentration of the constituent being measured for.*

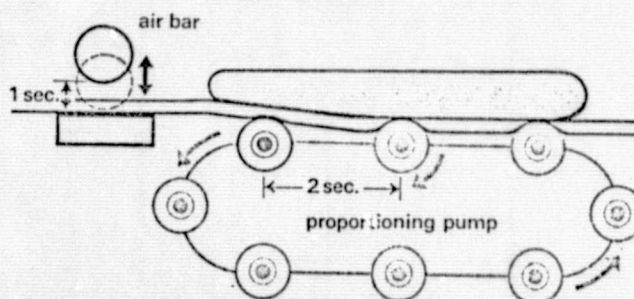
Herein lies the importance of segmenting each of the sample and reagent streams with air bubbles. In effect, the air bubbles act as barriers to divide each sample (and reagent stream) into a large number of discrete liquid segments. Equally important, the air bubbles continually "scrub" the walls of the tubing. This sequential wiping of the walls diminishes the possibility of contamination in succeeding segments of the same sample. Thus, should there be any interaction between two samples, it can easily be seen that the effects of this interaction will occur only in the first few segments of the second sample. In the middle segments, the air bubbles immediately preceding will have effectively cleansed the system and prevented further interaction.

It is these middle and final segments, free from interaction, which are recorded as the steady-state plateau and appear as flat lines on the SCG. This assurance of freedom from contamination can only be accomplished by continuous flow analytical techniques, which form the basis of all Auto-Analyzer systems. By contrast, in batch systems one never knows whether a result is valid (free from contamination) or imperfectly processed. All one sees is a number.



Precise Air-Segmentation

Advanced design features of the Proportioning Pump include a unique, "air-bar" device which adds air bubbles to the flowing streams in a precise and timed sequence. The air-bar is actually a pinch valve connected to the pump rollers that occludes or opens the air pump tubes at timed intervals. Every time a roller leaves the pump platen—and this occurs every two seconds—the air-bar rises and lets a measured quantity of air through. The release of air into the system is carefully controlled, thereby insuring exactly reproducible proportioning by the peristaltic pump.



Sample

A mere 2.0 ml. of untreated serum is all that is required for the accurate and simultaneous performance of all 12 biochemical tests.

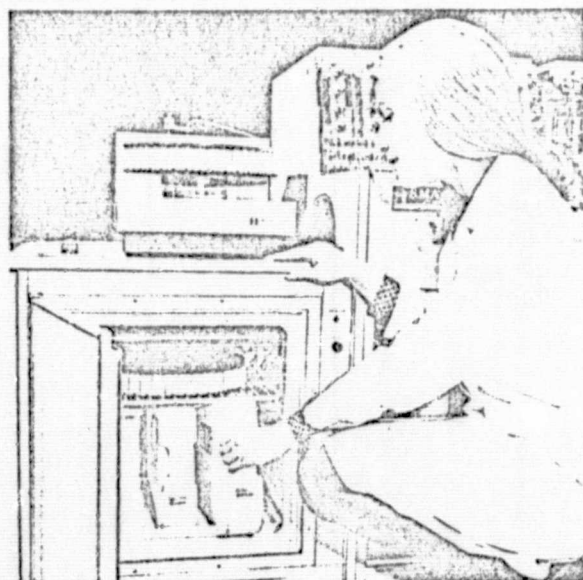
Efficiency and Economy

Although the SMA 12/60 vastly increases the productivity of the clinical laboratory, it requires no increase in laboratory staff. One operator can easily perform all duties required for the SMA 12/60. There are no lengthy computations of results, no tedious transcriptions of laboratory reports, and therefore, very little chance for associated errors to occur. The value of unsolicited information, as presented on the Serum Chemistry Graph, takes on new meaning when you consider that all of these data are available with a great deal less effort than is required to produce less than one-tenth as much by conventional means. (SMA 12/60 = 5184 results per day.)

Saves Space

Efficient space utilization is of paramount importance in all clinical laboratories today. A compact, completely integrated instrumental system, the SMA 12/60 console is L-shaped and provides easy access to operating controls and reagent shelves. All controls and flow lines are visible and within easy reach.

Reagents are stored in specially designed compact containers housed in the base of the console. Each container has a capacity for at least fifty hours of operation.

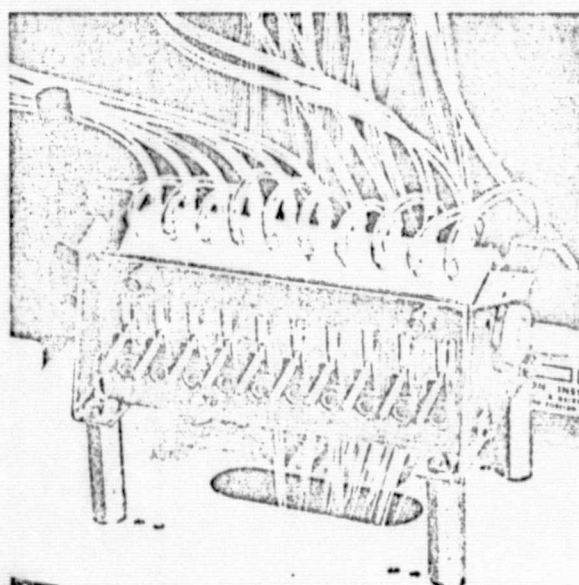


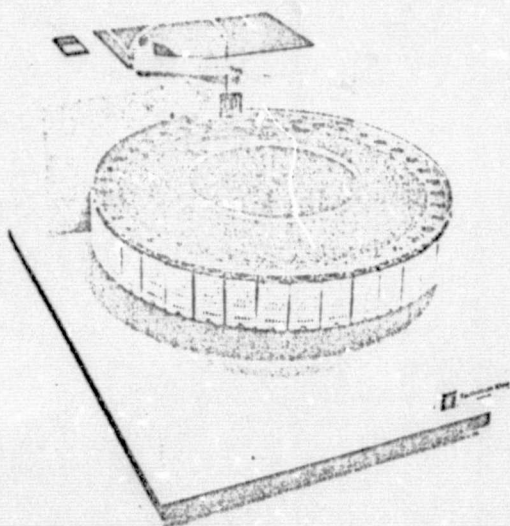
Built-In Refrigerator

The Sampler table includes a built-in refrigerator unit with enough space for six large reagent containers and two plates of samples. It is designed so that enzyme substrates or other heat-labile reagents can be stored in the refrigerator and fed directly from there to the analytical system.

Inlet Valves

Reagents are introduced into the system through valves. A mere flip of the lever permits a channel to be switched from aspirating reagents to water while the others continue to operate normally.





Sampler IV and Technicon IDeeTM

The Technicon IDee System for positive sample identification consists of a Sampler IV with optics, a buffer for storing the coded information, and a printing device for transferring the sample number to the Serum Chemistry Graph and to the Data Converter. The system uses adhesive labels which are affixed to (1) the sample tube immediately after the blood is drawn, (2) to the requisition slip, and (3) to a special sample cup that is inserted into the sampler. This last label is somewhat larger in size than the others because it utilizes a specially designed bar code that can be read optically.

With Technicon IDee, there is no need to verify that results on the graph correspond to the order of the specimens on the sampler. Nor is there any need to go through the time-consuming process of loading the sampler according to a loading list. "Stat" tests can be inserted into any of the 40 sample cup positions at any time, without interruption of normal laboratory procedures.



The Proportioning Pumps

The four Technicon Proportioning Pumps, which include the new air-bar design feature, are as characteristic of the AutoAnalyzer as the air bubbles separating samples. Each pump's chain-driven rollers depress up to 26 resilient plastic tubes. As the rollers move across the tubes, they propel the various fluids ahead of them into the system in the exact proportions required by the test. The volume of each fluid aspirated into the system by this process is determined by the inside diameter of its particular pump tube. The flow rate of each stream, whether liquid or gas, can be varied in 19 standard steps, from 0.015 ml/min. to 3.9 ml/per minute. However, the SMA 12/60 uses only the smaller sizes, thereby effecting low reagent consumption.

Completely positive in action with no slippage, the Proportioning Pump maintains precise ratios of flow continuously. It may be operated 24 hours a day for months on end. Two rollers are always in contact with the tubes to eliminate any possibility of backflow. There are no valves to clog or stick, no crevices to retain unwanted materials. The pump contacts only the tubes carrying the liquid, never the liquid itself. A built-in leak detector sounds an alarm and automatically stops the pump if a tube contacted by the pump rollers should develop a leak.

SMA 12/60

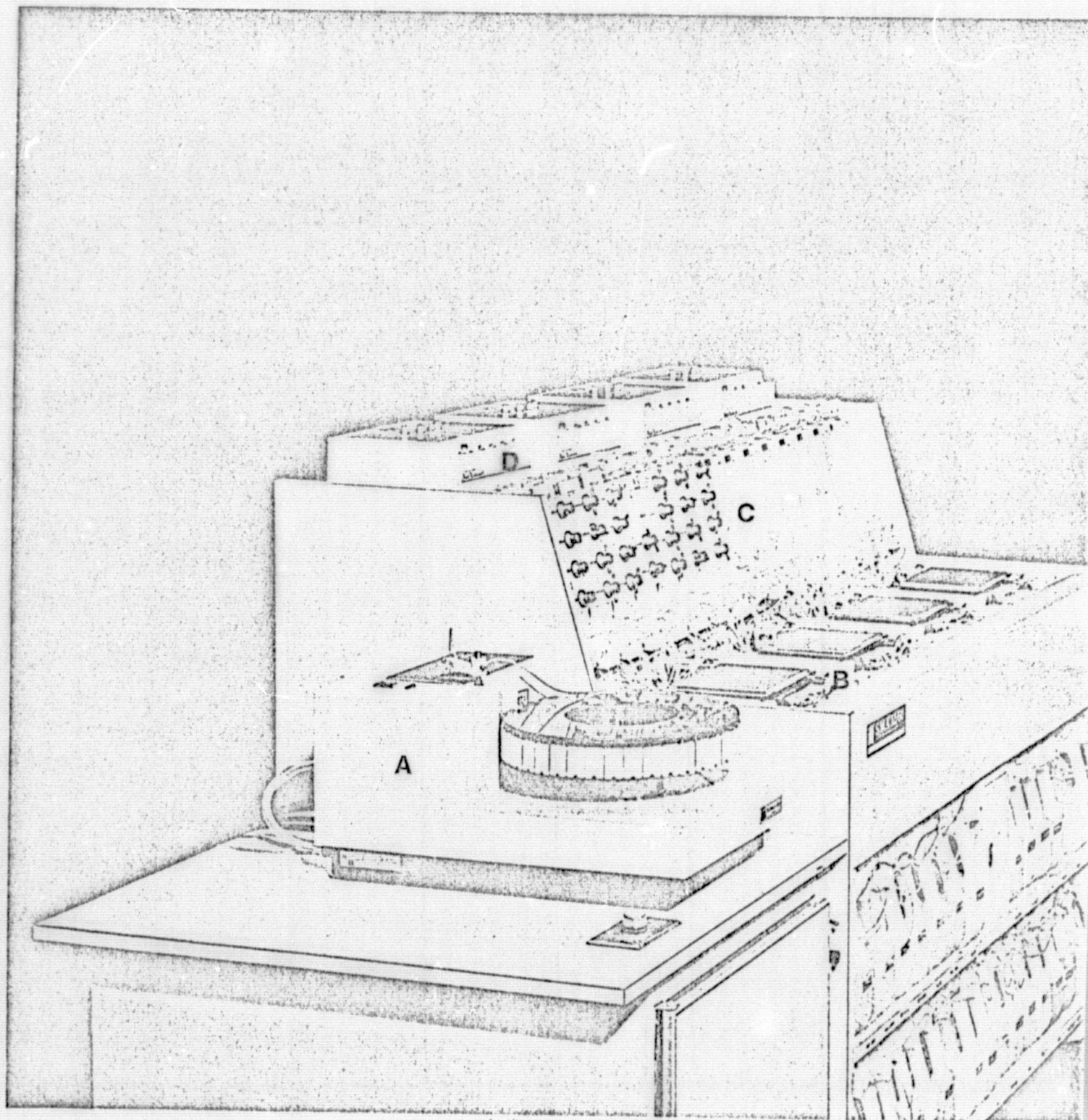
A. Sampler IV with Technicon IDee

B. Proportioning Pump

C. Analytical Cartridge

D. Colorimeter

E. Programmer



F. Recorder

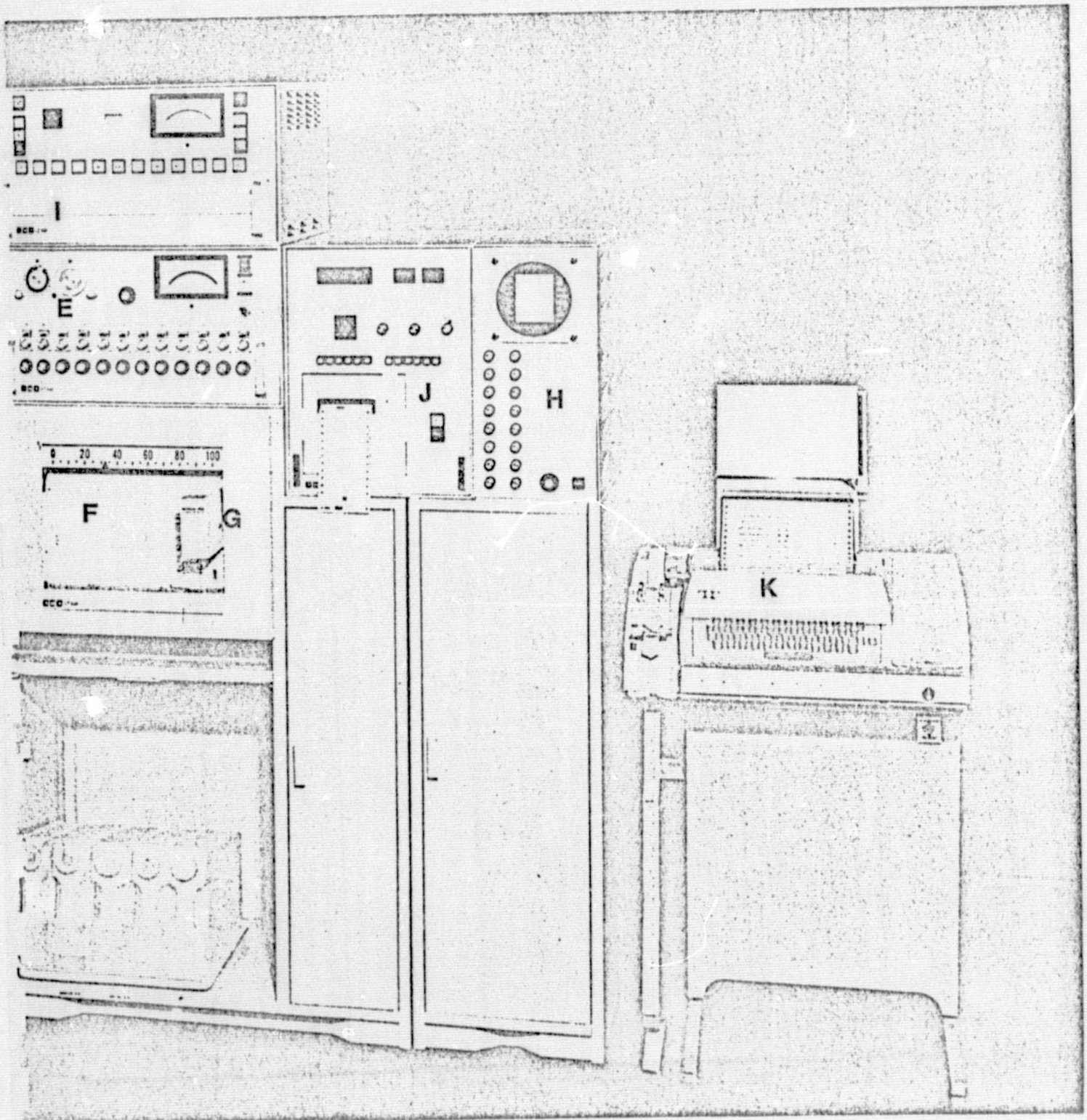
G. Printer

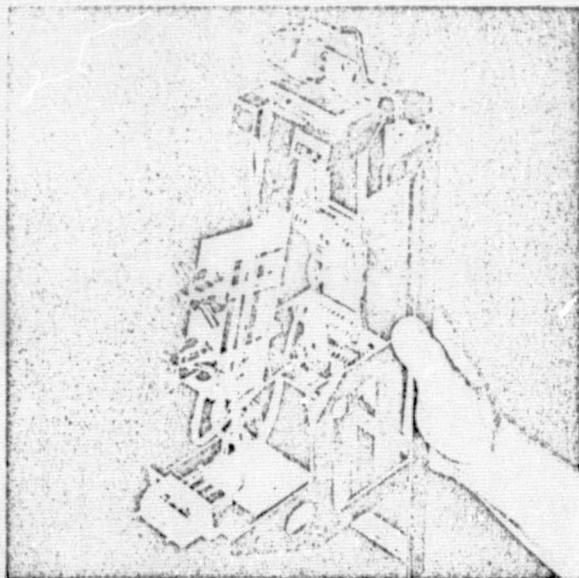
H. Function Monitor

I. Automatic Calibration Module

J. Data Converter

K. Teletype



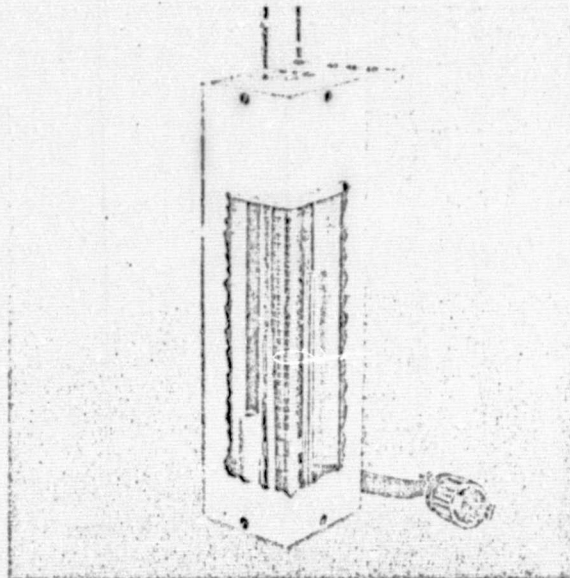


Analytical Cartridge

For those familiar with AutoAnalyzer and SMA-12 systems, the analytical cartridge perhaps represents the most revolutionary innovation on the SMA 12/60. Each test has its own removable analytical cartridge, which is, in effect, a miniaturization and integration into optimum form of all equipment necessary to perform such analytical techniques as mixing, dialysis, heating, time delay, and phasing. The analytical cartridge permits a simplification of technique resulting in increased flexibility and ease of operation. Any one of the 12 separate "plug-in" analytical cartridges can be removed and replaced by one designed to perform a different determination. (In addition, a change in test also requires a new function board in the programmer, a change of recorder paper, and a colorimeter filter substitution, all of which may be performed in the laboratory.)

Dialysis The miniature dialyzers in the Analytical Cartridges that require this technique are designed for easy accessibility. With the new Premount Dialysis Membranes a change can be accomplished in less than a minute. The Premounts are individually wrapped and moistened at the factory. The technologist merely opens the envelope, puts the membrane in place, and tightens the screws.

Bubble patterns are completely visible in the dialyzer at all times. Temperature control where necessary, is achieved by passing the donor stream (containing the sample) through a jacketed mixing coil. This kind of dialysis combined with the capability of automatic blank correction make Technicon SMA systems the only instruments capable of fully eliminating the effects of non-specific chromogens on test results.



Heating element For those procedures requiring heating or incubating as a step in color development, the new analytical cartridge incorporates a small individual short-path heating block through which the reaction stream passes. This element is thermostatically controlled and is not susceptible to changes in ambient temperature.

Phasing

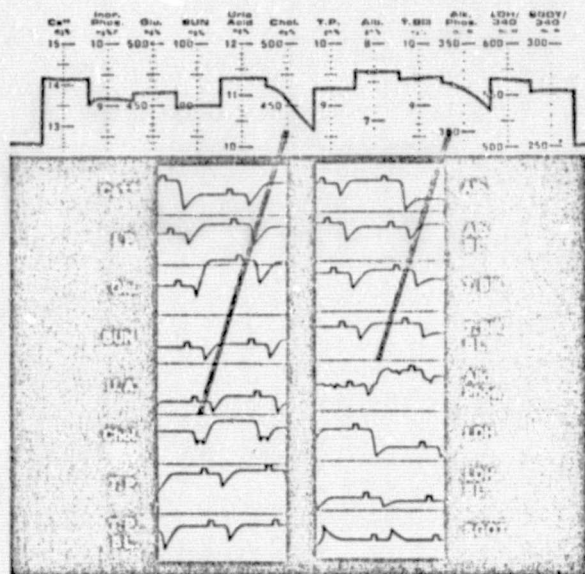
With 12 tests to be recorded on each sample and a sampling rate of 60 samples per hour, it follows that 5 seconds are allowed to record each steady state plateau. The reaction streams in the 12 channels and up to four blank channels must, therefore, be phased to arrive at the colorimeter in "waves" 5 seconds apart. For example, if the Cholesterol stream arrives at X time, calcium must arrive at X + 5 seconds, Total Protein at X + 10 seconds, Albumin at X + 15 seconds, etc.

In order to insure proper sequencing for presentation of the results, a number of devices have been provided to make this adjustment an extremely simple operation.

Time Delay Coils

Time-delay coils on the analytical cartridge accomplish sequencing of the up to 16 tests where time delay is required. They are easily accessible and can be quickly changed if the need arises.

Monitored curves with recorded portions raised



Function Monitor

A mere glance at this oscilloscope face is sufficient to tell if the system is in phase and recording at steady state levels.

The face of the oscilloscope is divided down the middle, with eight complete test curves displayed on one side, and eight on the other (including the four blank channels).

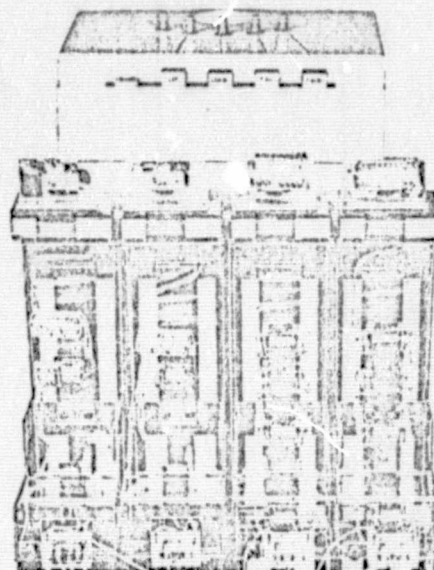
Each sample curve is recorded in its entirety, thus enabling the operator to see all sixteen curves for each sample at all times. While these curves are still on the oscilloscope the sixteen curves for the next sample are traced alongside, so that one has a complete visual presentation of the relationship between two consecutive curves. If desired, these curves may be held for study. Further, a raised portion of the steady state plateau indicates where the Serum Chemistry Graph was recorded.

The illustration above demonstrates the value of the Function Monitor.

On the SCG, all tests have been recorded at their steady-state plateaus with the exception of cholesterol and alkaline phosphatase. A quick glance at the tracings for these procedures on the function monitor immediately indicates the malfunction. In the case of cholesterol, the "blip" on the tracing occurs *between* samples and *not* on the steady-state portion of the curve. This is indicative of an improperly phased system.

While the alkaline phosphatase tracing in the SCG is slanted very much like cholesterol, the function monitor reveals the problem to be one of "noise" rather than phasing.

With this type of monitoring, phasing and detection of incipient irregularities can be accomplished while the test is being performed, rather than after the run is ended.



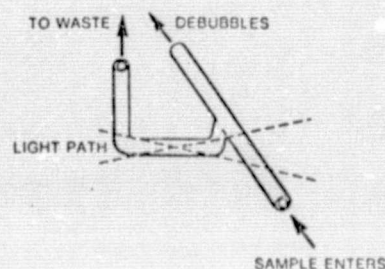
Colorimeters

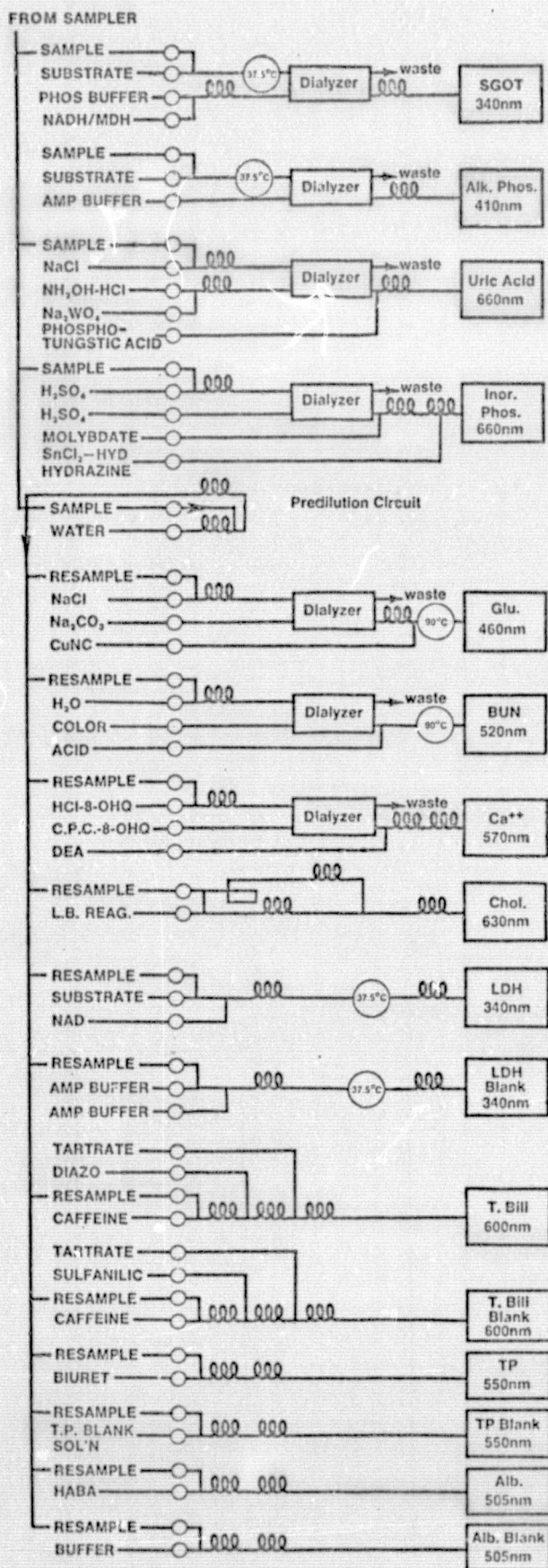
The new Colorimeters on the SMA 12/60 System have an improved wavelength range of from 340 to 700 nm, providing sensitive and specific enzyme analysis of the NAD/NADH linked reactions SGOT, SGPT and LDH.

To decrease lag time, the Colorimeter flowcells are located as close as possible to their analytical cartridges. The four Colorimeters, each consisting of four analytical channels and one reference channel, are positioned immediately above four of the analytical cartridges. The blank channels are identical to their sample channels and can be used interchangeably. Moreover, should one Colorimeter become inoperative, the system can still be run for the remaining 75 percent of the tests.

Flowcell

Many years of research have gone into the development of a flowcell that exhibits optimum wash (cleanout) characteristics. The result of this effort is a one-piece, all-glass debubbler and flowcell combination. By decreasing the volume of the new flowcell, while still maintaining an optimal optical path length, the wash characteristics of the entire system have been improved. This is extremely important, as the flow through the cell is unsegmented. In addition, the one-piece approach eliminates the possibility of connections coming apart or leaking. Each flowcell is held firmly in place by a single locking screw, which facilitates changing as required.





Flow System of Individual Chemistries

After the sample is aspirated, it is split six ways:

Stream 1 (SGOT) is incubated with substrate at 37°C and the reaction products are dialyzed into a buffered stream containing MDH and NADH. Dialyzed oxalacetate is reduced to malic acid, and NADH is oxidized to form NAD. The disappearance of NADH is measured in the inverse mode, the decrease in absorbance at 340 nm being directly proportional to GOT enzyme activity.

Stream 2 (Alkaline Phosphatase) is incubated with paranitrophenylphosphate substrate, dialyzed into a recipient stream of aminomethylpropanol buffer, and phased to the colorimeter.

Stream 3 (Uric Acid) is diluted with normal saline and dialyzed into a recipient stream of sodium tungstate and hydroxylamine. Phosphotungstic is then added for color development and the stream is phased to the colorimeter.

Stream 4 (Inorganic Phosphate) is diluted with sulfuric acid and dialyzed into sulfuric acid. After dialysis, ammonium molybdate and stannous chloride hydrazine are added, and the stream is phased to the colorimeter.

Stream 5 (Cholesterol) is mixed with Lieberman-Burchard reagent and phased to the colorimeter.

Stream 6 (T.P., Albumin, Calcium, Glucose, BUN, LDH, and Bilirubin) is diluted with water, and then this "main" sample stream is further split into 11 sub-streams:

(Glucose) Stream is diluted with saline, and dialyzed into and treated with sodium carbonate. Copper neocuproine is added, the mixture is heated to 90°C., and phased to the colorimeter.

(BUN) Stream is diluted with water, and dialyzed into a recipient stream of diacetyl monoxime and thiosemicarbazide. It is then treated with acid ferric chloride, heated to 90°C., and phased to the colorimeter.

(LDH) is analyzed by measuring the NADH that is formed when lactate and NAD are incubated with the sample at 37°C. Reaction mixture proceeds directly to photometer without dialysis. Blank subtraction is performed automatically, and the value reported is net LDH activity.

(LDH Blank) Same as assay except that AMP buffer is used in place of substrate and NAD.

(Calcium) Stream is mixed with HCl and 8-hydroxyquinoline and dialyzed into a solution of HCl, 8-hydroxyquinoline, and cresolphthalein complexone. After dialysis, base is added, and the stream is phased to the colorimeter.

(Total Bilirubin) Stream is mixed with caffeine, diazo, and tartrate, and phased to the colorimeter.

(Total Bilirubin Blank) Stream is mixed with caffeine, sulfanilic acid, and tartrate, and phased to the colorimeter.

(Total Protein) Stream is treated with biuret and phased to the colorimeter.

(Total Protein Blank) Stream is treated with alkaline iodide solution and phased to the colorimeter.

(Albumin) Stream is treated with HABA reagent and phased to the colorimeter.

(Albumin Blank) Stream is treated with phosphate buffer and phased to the colorimeter.

Flame IV

Twenty-four hour operation of the SMA 12/60 is possible with this durable, stable and efficient module. It features automatic, push-button operation, a new chamber design that allows a greater portion of the sample to reach the flame, an adjustable atomizer for regulating the sample flow rate, and a flame-shaping adjustment to shape the size of the flame cone to the desired height. The burner, atomizer assembly uses compressed air (not oxygen), and an improved flame-out detector is connected to a fuel line solenoid. An alarm sounds if the flame goes out, or if the instrument is turned off electronically. The solenoid automatically shuts off the fuel as a further precaution.

Programmer

The Programmer is the control module of the SMA 12/60. It contains solid-state electronic circuitry for measuring the output of the twelve analytical channels and for conditioning the signals so that a direct recording of concentration is printed on the recorder chart. Additionally, the Programmer assists in initial setup, troubleshooting, and proper operation of the SMA 12/60. It may also be used to perform blank, sensitivity, and linearity checks.

The dual scale meter and its associated controls serves a number of functions. The 'lower' calibration on the meter indicates the optical density of the solution.

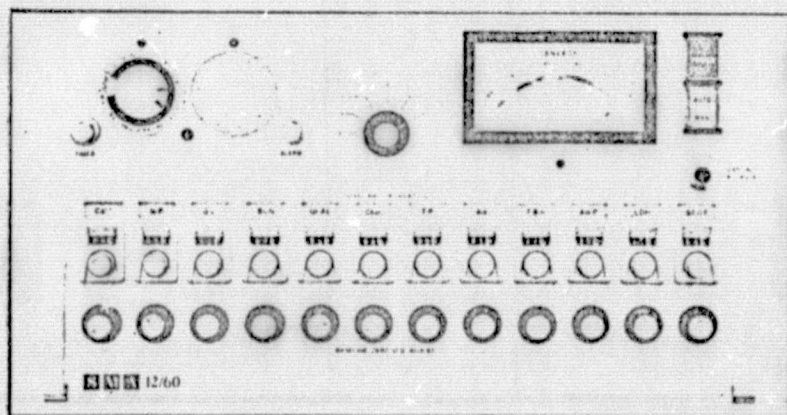
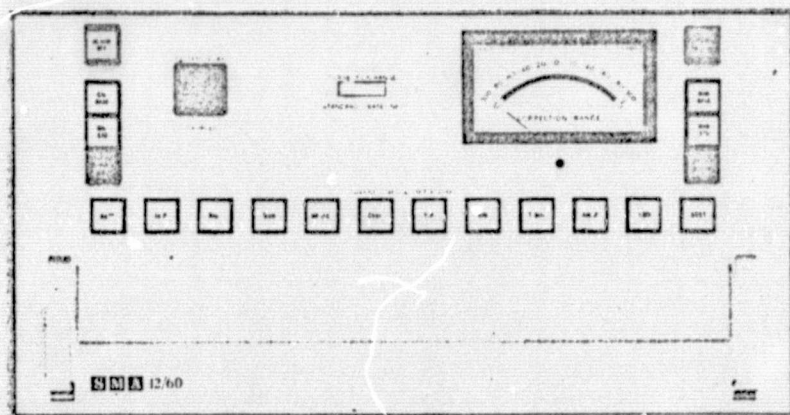
During normal operation, the control switch is placed in the "Record" position and blank correction is automatically performed. The O.D. reading given on the meter is the corrected value and corresponds to the concentration value being read on the recorder. If, however, it becomes important to know the assay value without blank correction, the control switch can be placed in the S/R (Sample/Reference) position and the O.D. value read off the meter. In addition, the sensitivity of any particular channel can be determined by reading the O.D. for a known standard value and linearity can be checked by taking O.D. readings from the meter.

The upper scale is an energy scale, which, when necessary, permits measurement of the energy levels in the sample, blank, and reference colorimeter channels. This can be extremely valuable for quickly checking a number of malfunction conditions, e.g., a dirty flow cell.

Automatic Calibration Module

This electronic module corrects and calibrates each channel on the SMA 12/60 System for baseline drift and sensitivity changes. Automatically, it returns the system to the true baseline and reference serum values. Manual resetting of channel potentiometers during a calibration cycle are therefore a thing of the past, as are manual adjustment errors.

The Automatic Calibration Module corrects for limited ranges of drift in the baseline and the standard calibration settings. These drift correction ranges are sufficiently broad to allow for automatic correction on a properly maintained system throughout the course of a day's run. Audio and visual alarms are incorporated into the calibration module to indicate a condition of excessive drift. Since excessive drift in a channel could indicate the presence of an incipient system problem, the drift alarms serve as an over-all system monitor.

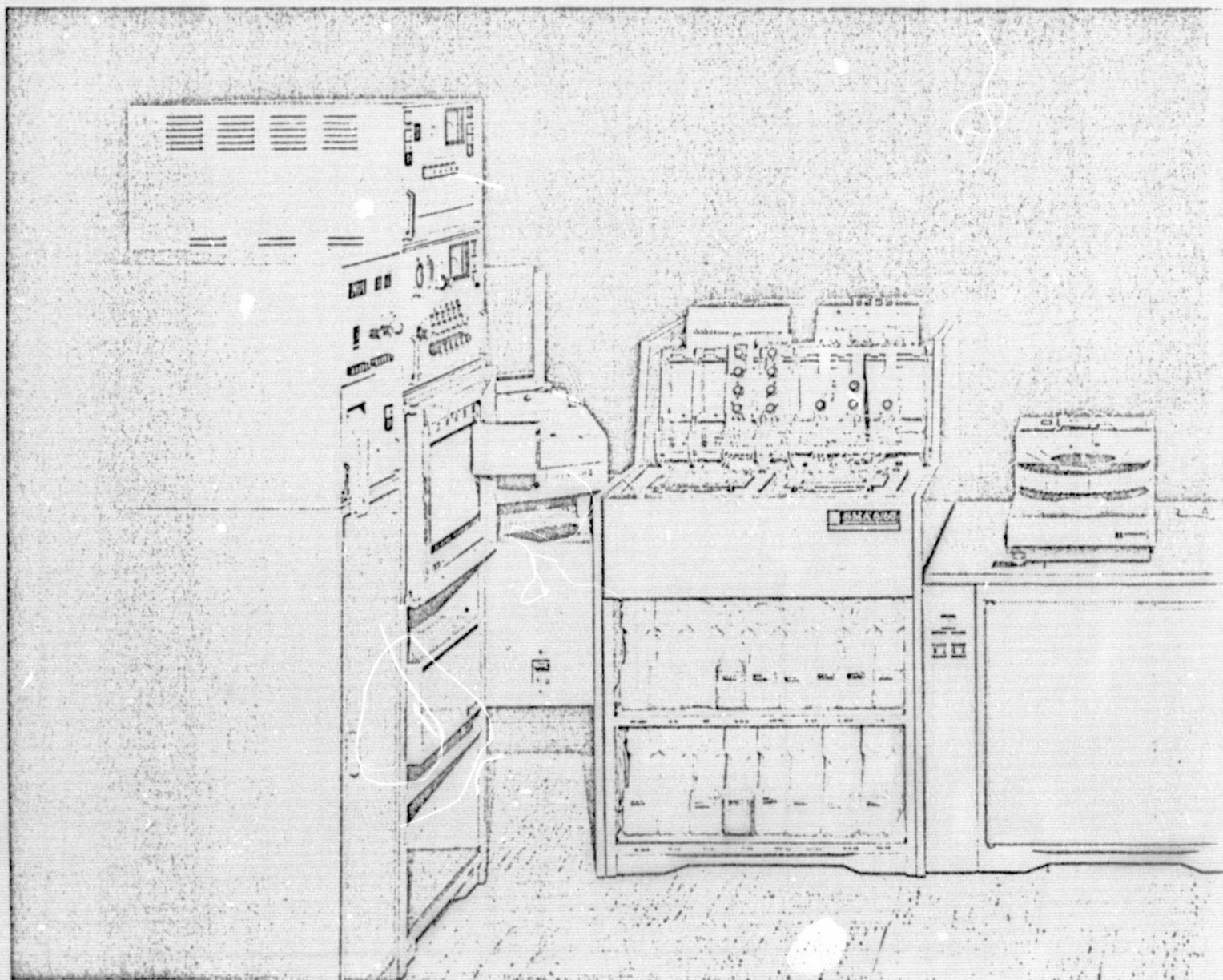


SMA[®] 18/60

... And for complete
biochemical profiling—
the SMA 18/60 System

The SMA 12/60 System achieves its maximum efficiency operating in the tandem mode with an SMA 6/60 System to provide the laboratory with the most complete spectrum profiling system available—the SMA 18/60 System.

Shown here, the SMA 18/60 System makes total profiling a routine operation by carrying further the concept that efficiency and economy are achieved by handling every sample the same way. Now with one technologist in attendance and using one sampler to feed the system at the rate of 60 samples per hour, the laboratory can produce 1080 tests per hour, including standards.

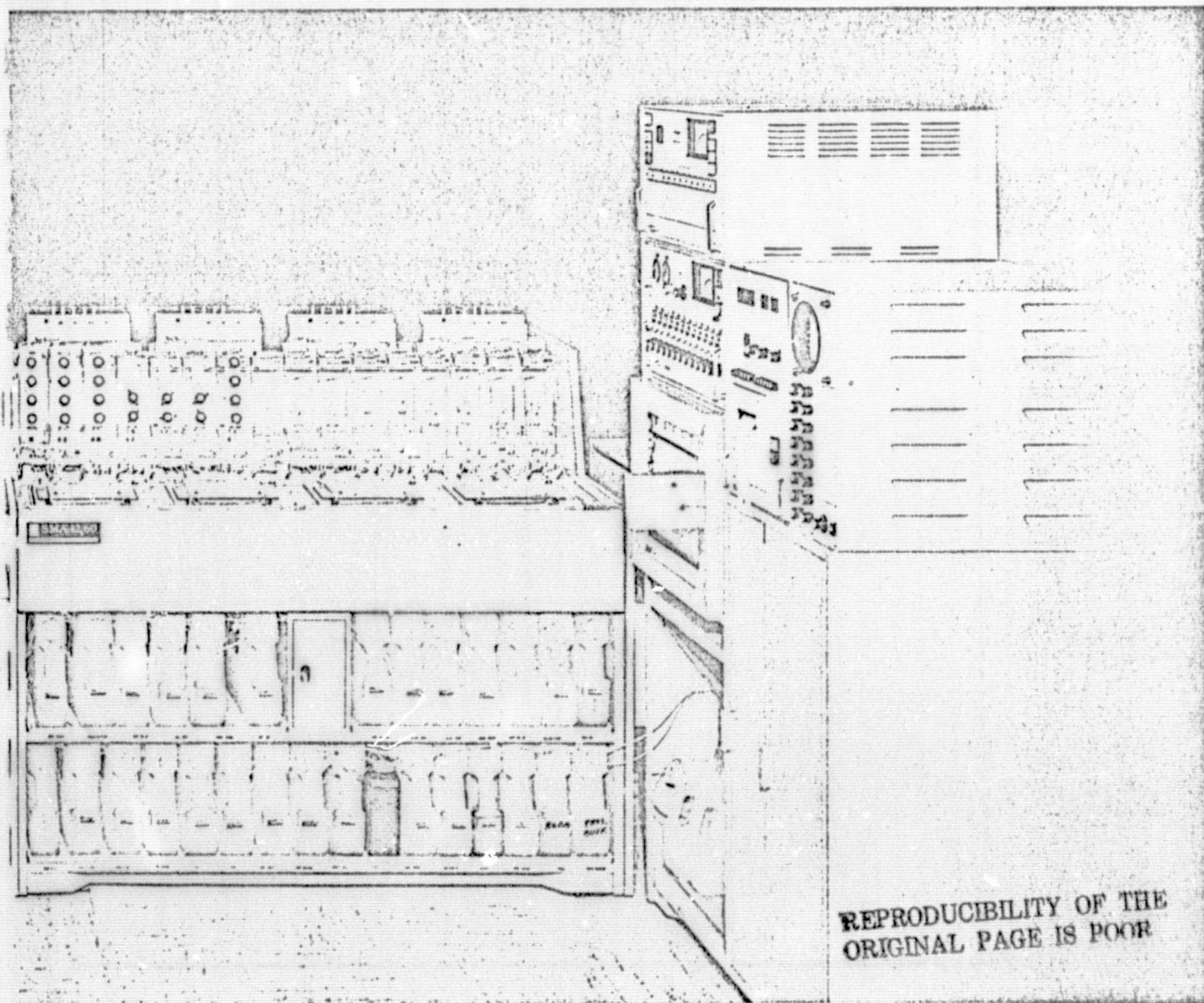


- Full-spectrum profiling—18 tests at 60 samples per hour.
- Completely automates four electrolyte parameters, which are difficult to analyze by traditional methods, and are among the most frequently requested "stat" tests in the laboratory.
- Standardizes procedures in the laboratory—even for these "stat" requests, which can now be handled the same way 24 hours a day. Placed in the sampler as soon as they are received, "stat" results will be available in less than ten minutes, with no interruption of the normal laboratory procedure.
- Provides better patient care by eliminating repeated venipunctures.
- Uses a sample as small as 2.6 ml.
- Service to one Analytical Cartridge can be performed without shutting down the entire system.

Parameters on the SMA 18/60 System Standard Configuration

(Custom designed configurations are also available.)

SGOT	Albumin (including blank)
LDH (including blank)	CPK
Alkaline Phosphatase	Creatinine
Total Bilirubin (including blank)	Sodium
Uric Acid	Potassium
Calcium	Chloride
Inorganic Phosphate	Carbon Dioxide
Cholesterol	Urea Nitrogen
Total Protein (including blank)	Glucose



REPRODUCIBILITY OF THE
ORIGINAL PAGE IS POOR

Medical Implications

Routine biochemical profiling of all serum samples processed by the hospital laboratory has been shown to effect substantial changes in, or reevaluations of, original diagnoses.

- After instituting this regimen, one large metropolitan hospital has found that "at least three in ten of the patients being admitted are harboring an additional disease or organ malfunction at such early stages of development that symptoms are not yet evident."¹ As an example, one patient admitted for elective surgery was found, on the basis of biochemical profiling, to have probably suffered a minor coronary. This condition was not sufficiently developed to cause changes to be noted in the electrocardiogram. In this case surgery was postponed and the patient referred to a cardiologist and a confirming diagnosis was made.

- Another investigator has reported that "the unrequested information in the profile admission chemistry was beneficial to almost one patient in every ten entering this hospital (Duke University Medical Center)," and for "one patient in every twenty" entering the VA Hospital in Durham, No. Carolina. In addition, at the latter institution, "It was deemed of particular interest by the physicians that in 2% of the cases, the unexpected findings resulted in substantially earlier institution of important therapy."

- Another leading university medical center³ found that in excess of 10% of all patients routinely profiled turned up unexpected values.

- The director of pathology at a large southwestern hospital recently stated, "In my eight years experience in a 300-bed hospital, not one case of parathyroid adenoma had been diagnosed. With the introduction of an SMA 12 and routine chemical profiling, three cases were diagnosed in the first three months."⁴

- Moreover, information is available to indicate that the patterns described above are representative of what has happened in hundreds of hospitals here and abroad since the introduction of sequential multiple analysis.

Recently, a special Senate Subcommittee on "Detection and Prevention of Chronic Disease Utilizing Multiphasic Health Screening Techniques,"⁵ stated that:

The evidence is conclusive that multiphasic health screening can be a practical and important tool for the medical profession in the early discovery and ultimate treatment of chronic disease.

Until the introduction in 1965 of Sequential Multiple Analysis, in the form of the SMA 12, comprehensive biochemical profiling had been prohibitive because of time, labor, and cost considerations. The experiences gained from extensive use of this revolutionary instrumentation have shown that these obstacles are no longer a factor... 60 samples per hour... one technologist... cost per 12 parameter test less than that of two parameters performed individually.

Free Training Course

Although its basic concepts and operation are simple, instruction in the use and maintenance of the SMA 12/60 is necessary. To accomplish this, Technicon conducts training courses at its Science Center in Tarrytown, New York.

At the course, held in a specially equipped laboratory and amphitheatre lecture hall, the customer is instructed by a full-time staff of teachers on the assembly, operation, and service of the instrument.

No Down Time

If a customer needs assistance regarding procedures or reagents, or is having electronic or mechanical difficulties, he can phone Technicon collect, at any hour of the day, any day of the week, and talk to a specialist. Furthermore, there is now available to all Technicon customers a full staff of Field Service Engineers who are trained and equipped to remedy any problem, be it chemical, mechanical or electronic, which cannot be dealt with by telephone.

In addition to the Tarrytown Science Center, there are now Technicon Distribution Centers in Montreal, Cleveland, Atlanta, Chicago, Dallas, and Los Angeles, designed to give you fast, accurate service on chemicals and other expendable supplies.

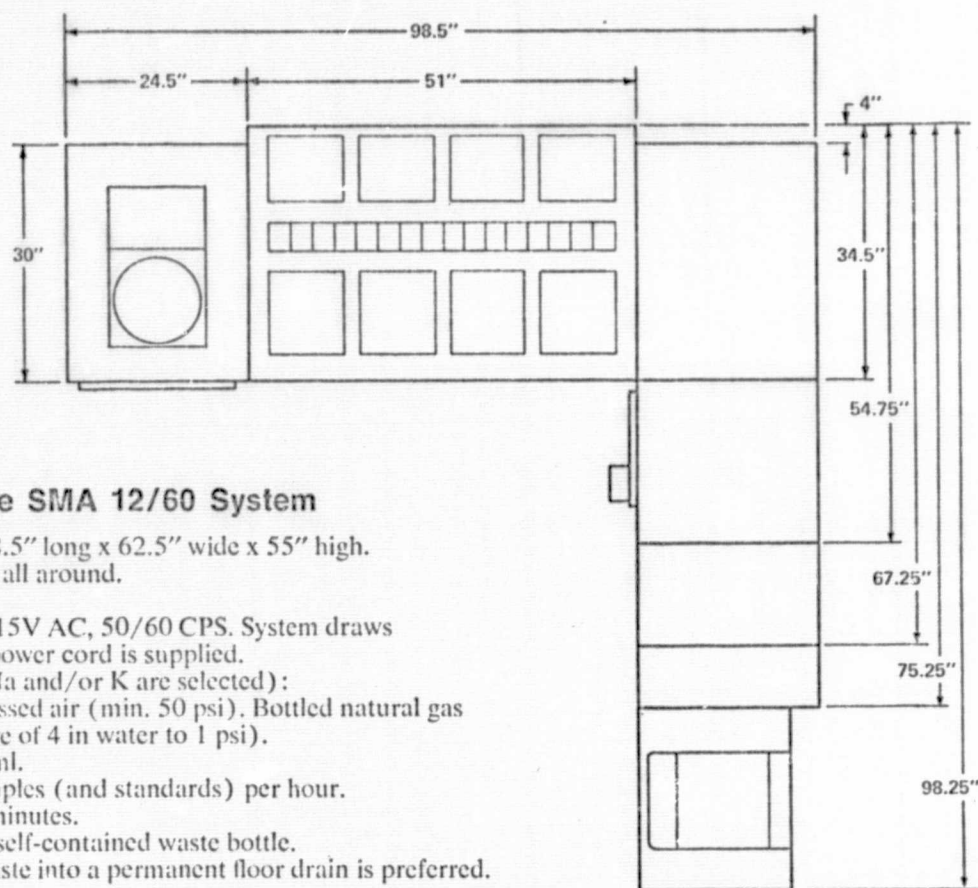
1. Kerns, W. H., "Casey's Profiles" Expand Diagnostic Role, MODERN HOSPITAL, Vol. 108, No. 4, April 1967.

2. Profile of Admission Chemical Data by Multi-channel Automation: An Evaluation Experiment, R. E. Thiers et al., Clinical Chemistry, Vol. 12, No. 3, p. 137, 1966.

3. Personal communication from Dewitt J. Hunter, M.D., Univ. of Utah Medical Center, Salt Lake City, Utah.

4. From material presented at the 1967 Technicon Symposium on "Automation in Analytical Chemistry."

5. U.S. Government Printing Office, Washington, D. C., 1966.



Specifications of the SMA 12/60 System

DIMENSIONS: L-shaped. 98.5" long x 62.5" wide x 55" high.

Allow access room of 3' all around.

WEIGHT: 1200 pounds.

POWER REQUIREMENTS: 115V AC, 50/60 CPS. System draws 1200 watts. One 15 ft. power cord is supplied.

FUEL REQUIREMENTS (if Na and/or K are selected):

Piped or bottled compressed air (min. 50 psi). Bottled natural gas or propane (line pressure of 4 in water to 1 psi).

VOLUME OF SAMPLE: 2.0 ml.

RATE OF ANALYSIS: 60 samples (and standards) per hour.

ANALYSIS LAG TIME: 8½ minutes.

DRAIN: System drains into self-contained waste bottle.

However, connecting waste into a permanent floor drain is preferred.

DATA CONVERTER

DIMENSIONS: 20.5" deep x 17" high x 12.5" wide.

WEIGHT: Approximately 62 pounds.

ELECTRICAL REQUIREMENTS: 115 volts $\pm 10\%$, 50/60 Hz, single phase, 1.5 amperes.

The power cable of the Data Converter must be connected to an electrical Outlet Strip of the SMA system.

ENVIRONMENTAL REQUIREMENTS: Operating Temperature Range:

+10°C to +50°C

(+50°F to +122°F) Relative Humidity not exceeding 90%.

TECHNICON IDee

DIMENSIONS:	Buffer	Sampler	Recorder-Chart Printer
Height	10"	15"	16"
Depth	16"	20"	17"
Width	15"	13"	20"
WEIGHT:	40 lbs.	30 lbs.	40 lbs.
POWER REQUIREMENTS:	115 V AC	115 V AC	115 V AC

Automatic Calibration Module

OPERATING VOLTAGE: 115 V AC, 60 Hz (50 Hz also available)

OPERATING CURRENT: ½ A

DIMENSIONS: 20" long x 11" wide x 20" high

WEIGHT: 50 lbs.



Technicon Instruments Corporation

Tarrytown, New York 10591/Telephone 914-631-8000

PROPOSAL NO. 103-0001122

JULY 20, 1976

S. BARBARA SINGER
 CLINICAL INSTITUTE OF TECHNOLOGY
 CLINICAL RESEARCH INSTITUTE
 10 WEST 35TH STREET
 CHICAGO, ILLINOIS 60616

TELEPHONE

PART NO.	QTY	PRODUCT DESCRIPTION	UNIT PRICE	EXTENSION
		CATALOGUE NUMBER: 103		
1		TECHNICON SMA 12/60 AUTOCANALYZER SYSTEM FOR THE AUTOMATED SEQUENTIAL ANALYSIS OF UNMEASURED INDIVIDUAL SERUM SAMPLES CUSTOM DESIGNED TO PROVIDE TWELVE BIOCHEMICAL PROCEDURES	95,000.00	95,000.00
		ALBUMIN		
		ALKALINE PHOSPHATASE		
		BILIRUBIN TOTAL (WITH BLANK)		
		BILIRUBIN DIRECT		
		(AVAILABLE ONLY WITH BILIRUBIN TOTAL (WITH BLANK))		
		CALCIUM		
		CARBON DIOXIDE		
		CHLORIDE		
		CHOLESTEROL		
		CPK		
		CREATININE		
		GLUCOSE VIA NEOCUPRONE		
		GLUCOSE VIA GLUCOSE OXIDASE		
		INORGANIC PHOSPHATE		
		LDH (WITH BLANK)		
		LDH FRACTIONATED (WITH BLANK)		
		(DOES NOT REQUIRE A BLANK CHANNEL WHEN ORDERED WITH LDH (WITH BLANK))		
		POTASSIUM/SODIUM (2 TESTS)		
		(FLAME PHOTOMETER REQUIRED)		
		SERUM IRON		
		SGOT		
		SGPT (WITH BLANK)		
		TOTAL PROTEIN (WITH BLANK)		
		UREA NITROGEN		
		URIC ACID		

THE SMA 12/60 CONSISTS OF:

- 1 SAMPLER IV
- 4 PORTIONING PUMPS MODEL III
- 1 MULTI ANALYSIS PROGRAMME

REPRODUCIBILITY OF THE
 ORIGINAL PAGE IS POOR



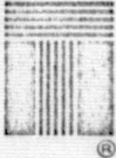
Technicon Instruments Corporation

Tarrytown, New York 10591/Telephone 914-631-8000

QUANTITY
PAGE 2

PROPOSAL NO. 103-0001122

PART NO.	QTY	PRODUCT DESCRIPTION	UNIT PRICE	EXTENSION
		MULTI CHANNEL COLORIMETERS MODEL 5		
	1	SINGLE PEN MULTI ANALYSIS SEQUENTIAL RECORDER		
	1	REFRIGERATOR UNIT		
	4	REAGENT INPUT VALVES		
		ANALYTICAL CARTRIDGES WITH GLASS AND PLASTIC FITTINGS TUBING PHASING COMPONENTS AND WHERE NECESSARY DELAY COILS DIALYZERS AND SEALED HEATING UNIT BLANK CARTRIDGES WHERE NEEDED		
	1	FUNCTION MONITOR OSCILLOSCOPE		
	3	CONSOLE UNITS FOR HOUSING ANALYTICAL MODULES REAGENTS DRAIN SYSTEMS VOLTAGE STABILIZERS JUNCTION BOX ELECTRICAL POWER STRIPS FUNCTION MONITOR OSCILLOSCOPE AND REFRIGERATOR		
		REAGENTS AND REFERENCE SERUM FOR 2 WEEKS OPERATION BASED ON A 4 HOUR DAY		
		OPTIONAL		
0-A005-01	1	MULTI-ANALYSIS FLAME PHOTOMETER MODEL IV	ADD	2,500.00
9-8026-01	1	SINGLE STAGE 100 PSI AIR COMPRESSOR	ADD	420.00
		SELECT ONE OF THE FOLLOWING REGULATORS FOR USE WITH THE FLAME PHOTOMETER MODULE		
0-B144-01	1	NATURAL GAS TANK STEP-DOWN REGULATOR		
0-B152-01	1	PROPANE TANK STEP-DOWN REGULATOR		
1-0002-01	1	TECHNICON SMA DATA CONVERTER SYSTEM A FULLY AUTOMATED SELF CONTAINED UNIT THAT PRINTS OUT SMA TEST RESULTS TOGETHER WITH THE DATE AND SEQUENCE NUMBER ON A TRIPPLICATE DIGITAL REPORT FORM	ADD	11,000.00
		OPTIONS FOR DATA CONVERTER SYSTEM		
7-0004-01	1	DATA OUTPUT INTERFACING FOR COMPUTER OR TELETYPE OPERATION WITHOUT TELETYPE	ADD	1,180.00



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PROPOSAL NO. 103-0001122

PART NO.	QTY	PRODUCT DESCRIPTION	UNIT PRICE	EXTENSION
17-2004-02	1	DATA OUTPUT INTERFACING FOR COMPUTER OR TELETYPE OPERATION WITH TELETYPE	ADD	2,950.00
12-0120-01	1	TELETYPE	ADD	1,770.00

A MAXIMUM OF FOUR (4) DETERMINATIONS
INCLUDING THE DESIGNATION (WITH
BLANK) CAN BE INCORPORATED IN ANY
COMBINATION OF TWELVE (12) TESTS

LDH FRACTIONATED (WITH BLANK) DOES NOT
REQUIRE A BLANK CHANNEL WHEN ORDERED
WITH LDH (WITH BLANK)

THE MULTI ANALYSIS FLAME PHOTOMETER
MODEL IV IS REQUIRED ONLY WHEN
SODIUM/POTASSIUM DETERMINATIONS ARE
CHOSEN. THE FLAME PHOTOMETER IS FOR
USE WITH BOTTLED NATURAL GAS OR
BOTTLED PROPANE. WHEN ORDERING YOUR
FUEL REQUIREMENTS MUST BE SPECIFIED

DELIVERY: 60/90 DAYS AFTER RECEIPT OF ORDER
C.B. : TARRYTOWN, N.Y.
TERMS: NO DISCOUNT, NET 30 DAYS
PRICES: FIRM FOR 30 DAYS

AUTHORIZED SIGNATURE

Incent Stanley
INCENT STANLEY
LES CORRESPONDENT